

# *Cactoblastis cactorum* en Norte América - panorama general

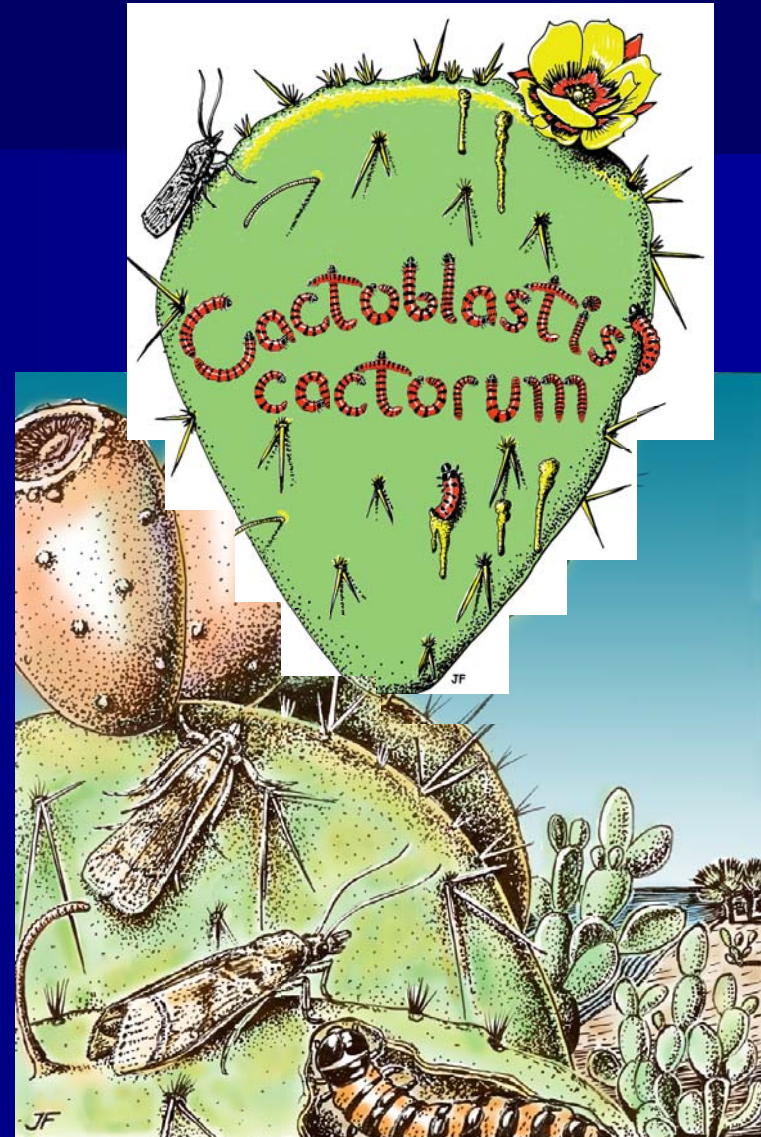
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and  
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# *Cactoblastis cactorum* en Norte América - panorama general

- The Bug & Its Life
- Travels to the USA
- Big Events and the Players: 1989-2007



# The BUG

- *Cactoblastis cactorum* (Berg)
- Order: Lepidoptera  
Family: Pyralidae  
Sub-family: Phycitinae
- Native to South America
- 5 species described in the genus,  
all from SA

# LIFE CYCLE

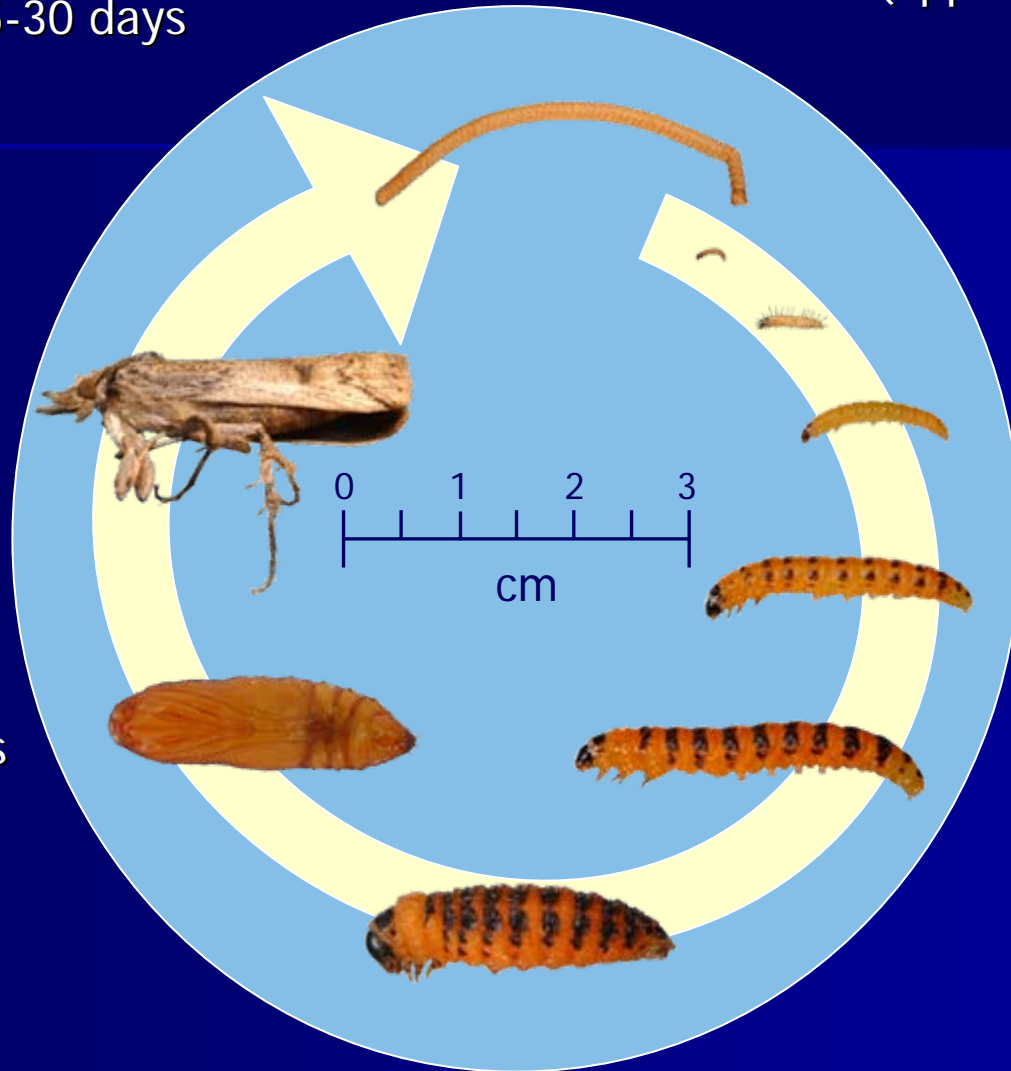
(approx. 90 days)

50-80 eggs/egg stick  
25-30 days

5-10 days

15-20 days

5 instars  
30-35 days





EGG





LARVAE

# PUPAE







ADULT



# DAMAGE



# Opuntia Hosts

- *Platyoptunia* – pad forming *Opuntia* - preferred



Large tree-like <i>Opuntia</i>	Shrub-like <i>Opuntia</i>	Low-growing <i>Opuntia</i>
<i>O. cochenillifera</i>	<i>O. antillana</i>	<i>O. aurantiaca</i>
<i>O. megacantha</i>	<i>O. cardiosperma</i>	<i>O. curassavica</i>
<i>O. robusta</i>	<i>O. corallicola</i>	<i>O. taylori</i>
<i>O. streptacantha</i>	<i>O. cubensis</i>	<i>O. salmiana</i>
<i>O. tomentosa</i>	<i>O. dillenii</i>	<i>O. repens</i>
	<i>O. engelmannii</i>	
	<i>O. humifusa</i>	
	<i>O. elaeagnifolia</i>	
	<i>O. lindheimeri</i>	
	<i>O. monilliformis</i>	
	<i>O. pusilla</i>	
	<i>O. pubescens</i>	
	<i>O. tardospina</i>	
	<i>O. triacantha</i>	
	<i>O. tuna</i>	

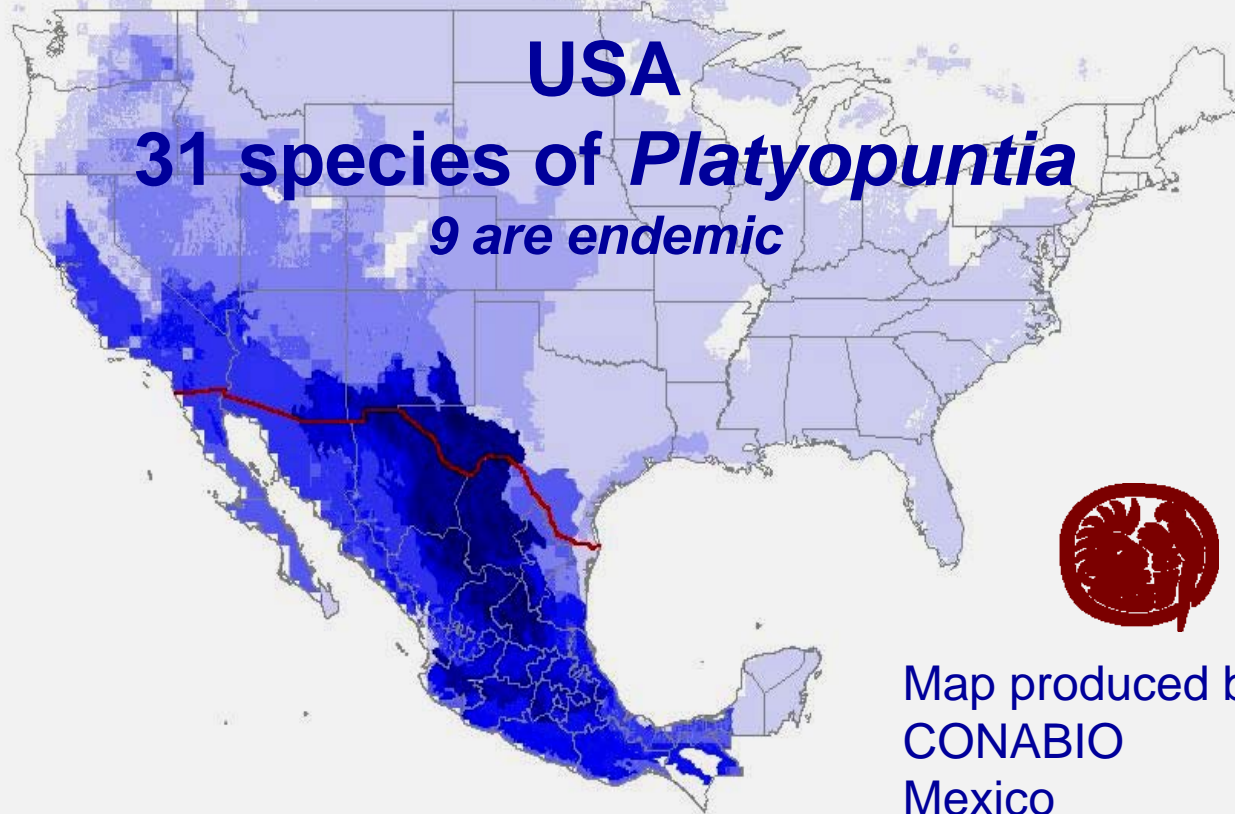
**Most *Platyoptunia*  
tested are hosts  
of the Cactus Moth**

- *Cylindropuntia* – “cholla” - not preferred



# *Opuntia* species distribution

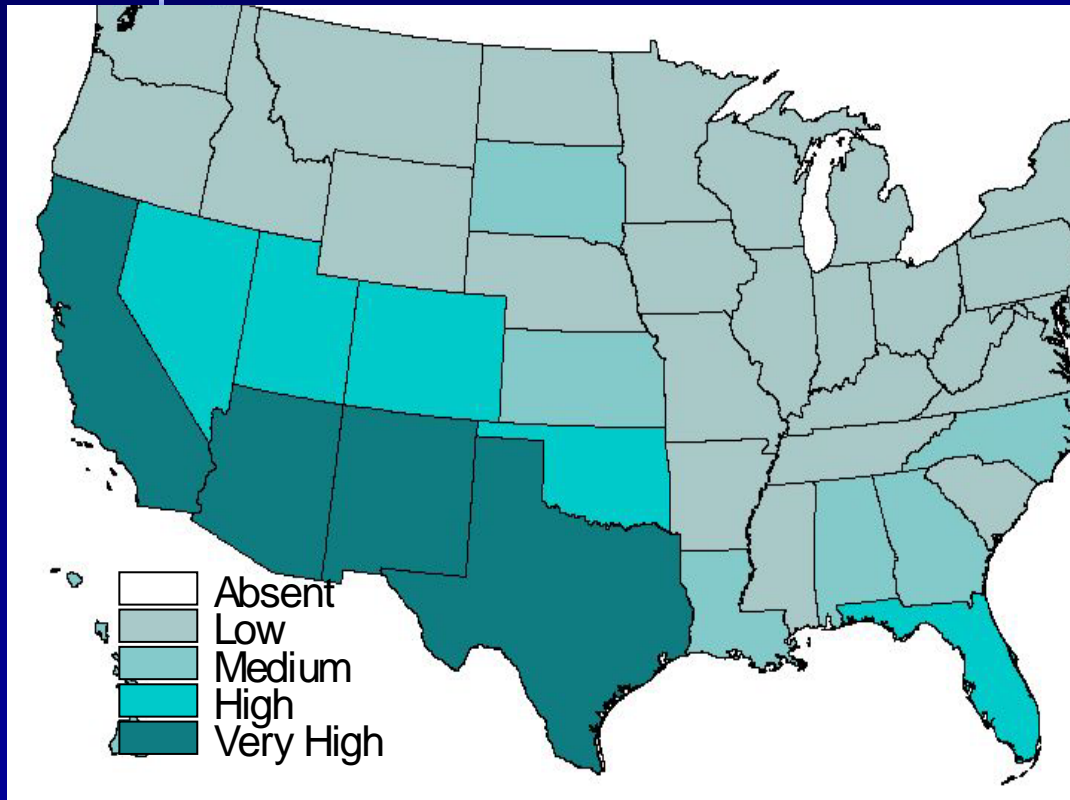
***Opuntia* species occur in 47 states**



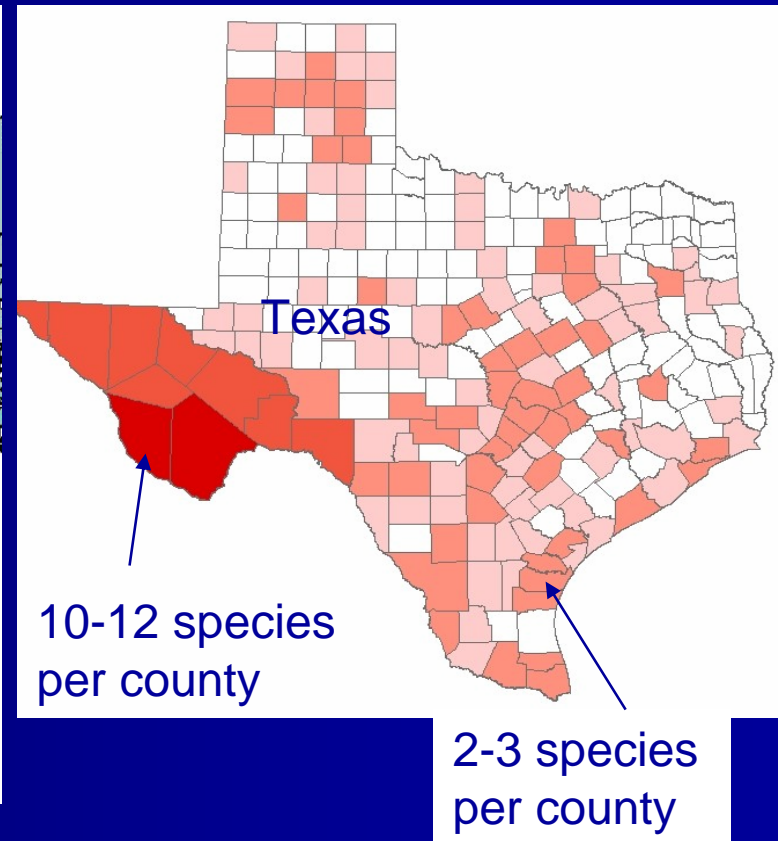


# *Opuntia* species distribution

The number of species increases going westward



source: US Geological Survey/NatureServe



source: The Nature Conservancy

# History of Cactus Movement

- Cactus are native to the New World
- 1600's to 1800's
- *Opuntia* (prickly pear) spp were planted around the world for production of fruit, forage and cochineal dye produced by a scale insect (*Dactylopius* spp.)
- *Opuntia* spp. became serious weeds in countries where it was not native
- Australia introduced *C. cactorum* (1920's) to control *Opuntia* spp.

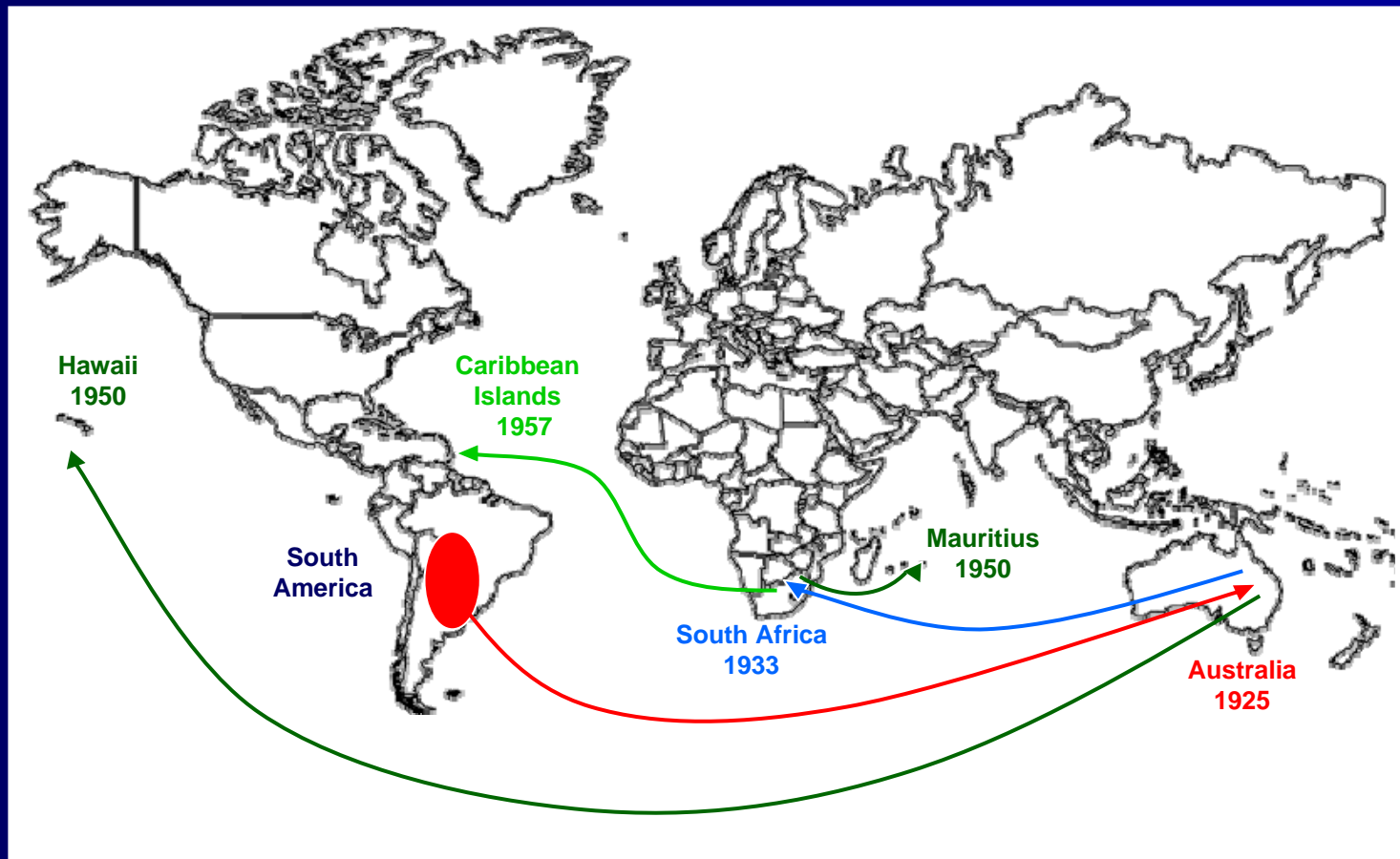


# Native home of *C. cactorum*

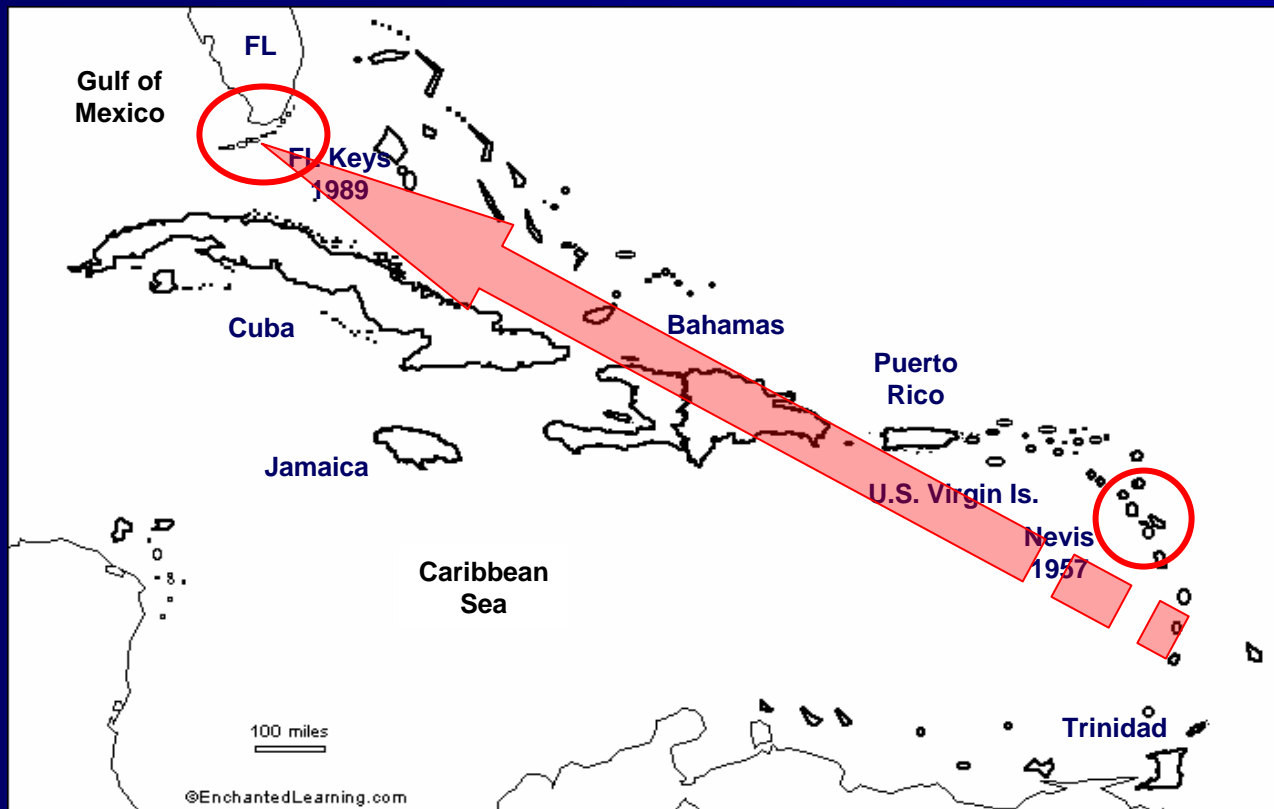


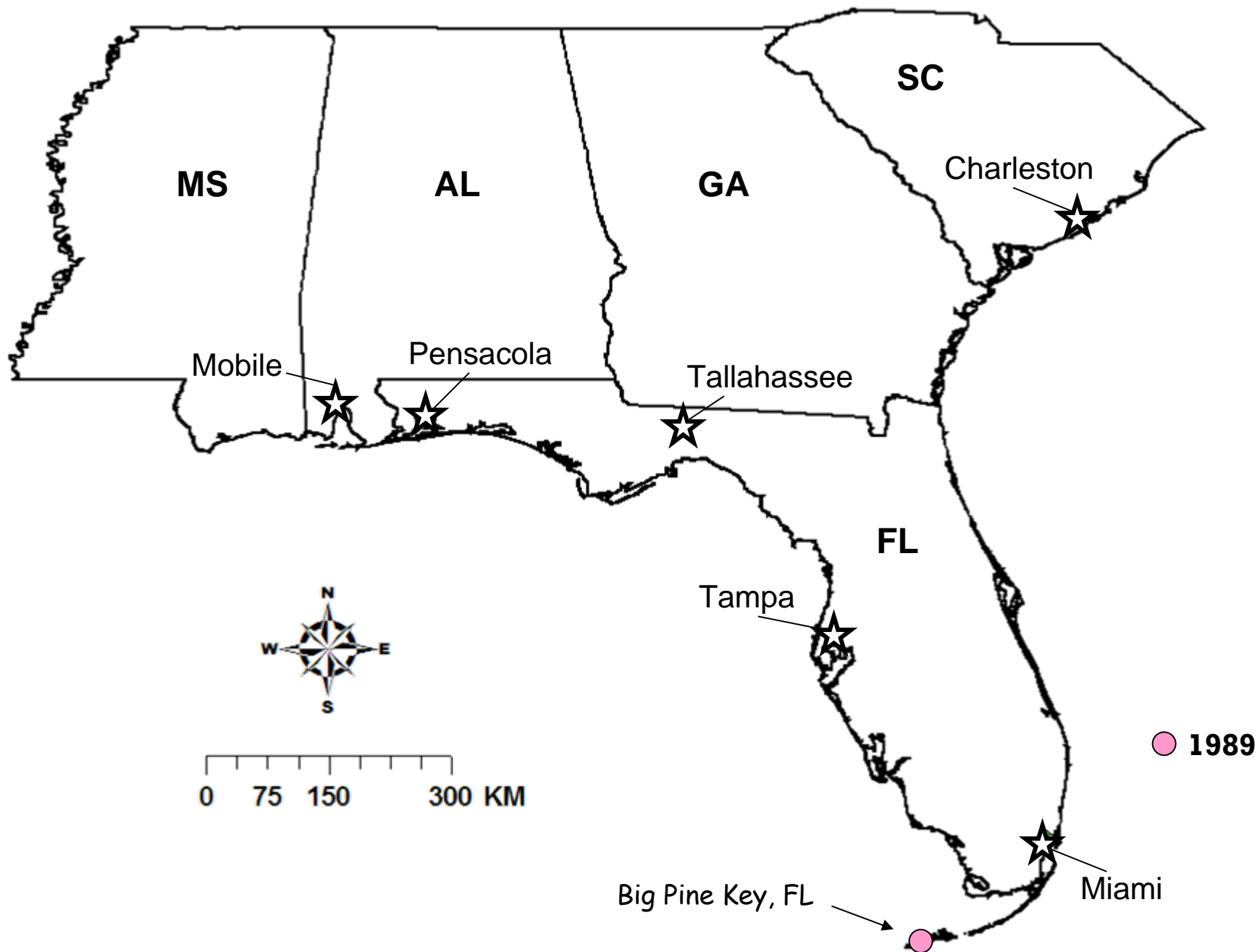


# History of Cactus Moth Movement

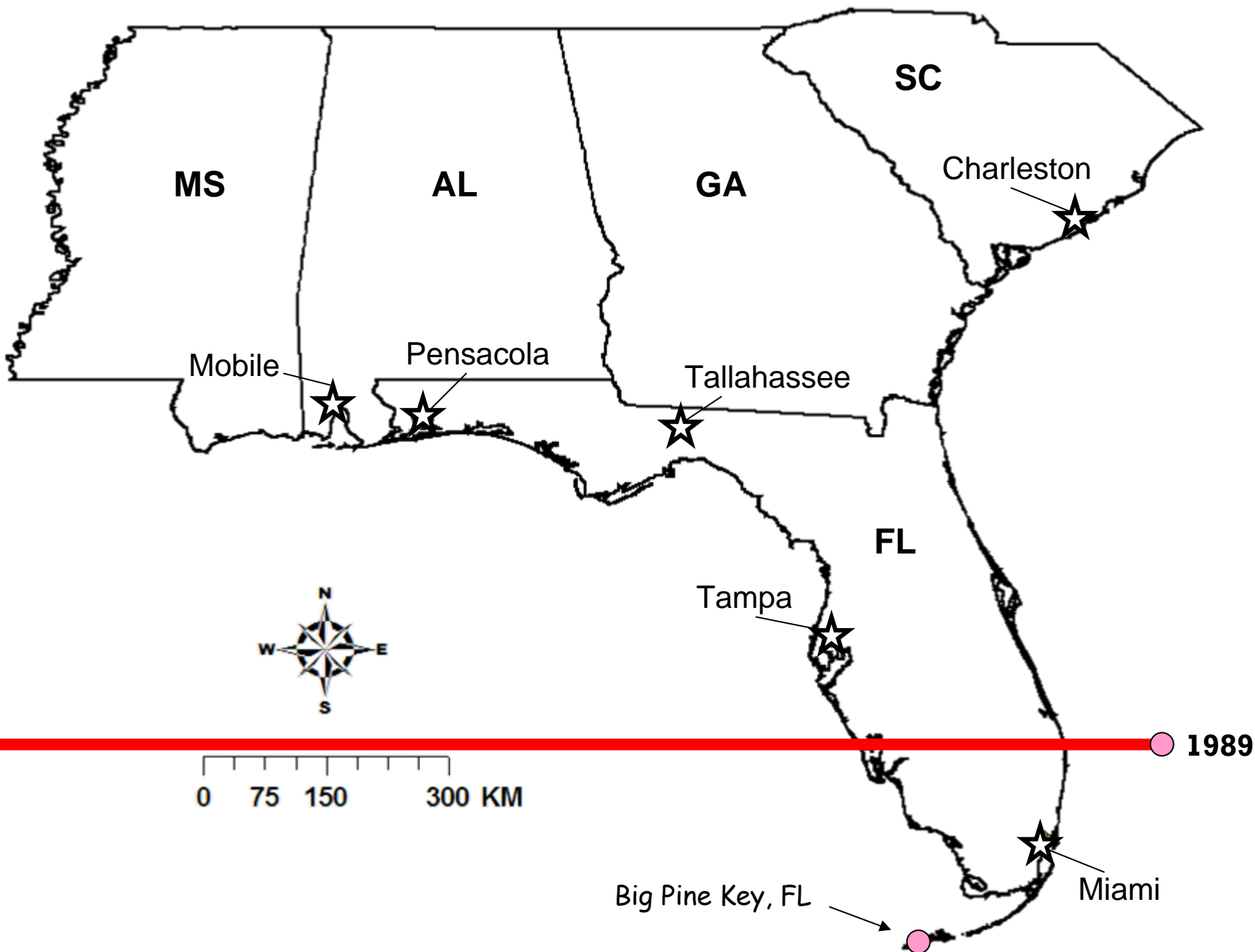


# History of Movement - Caribbean



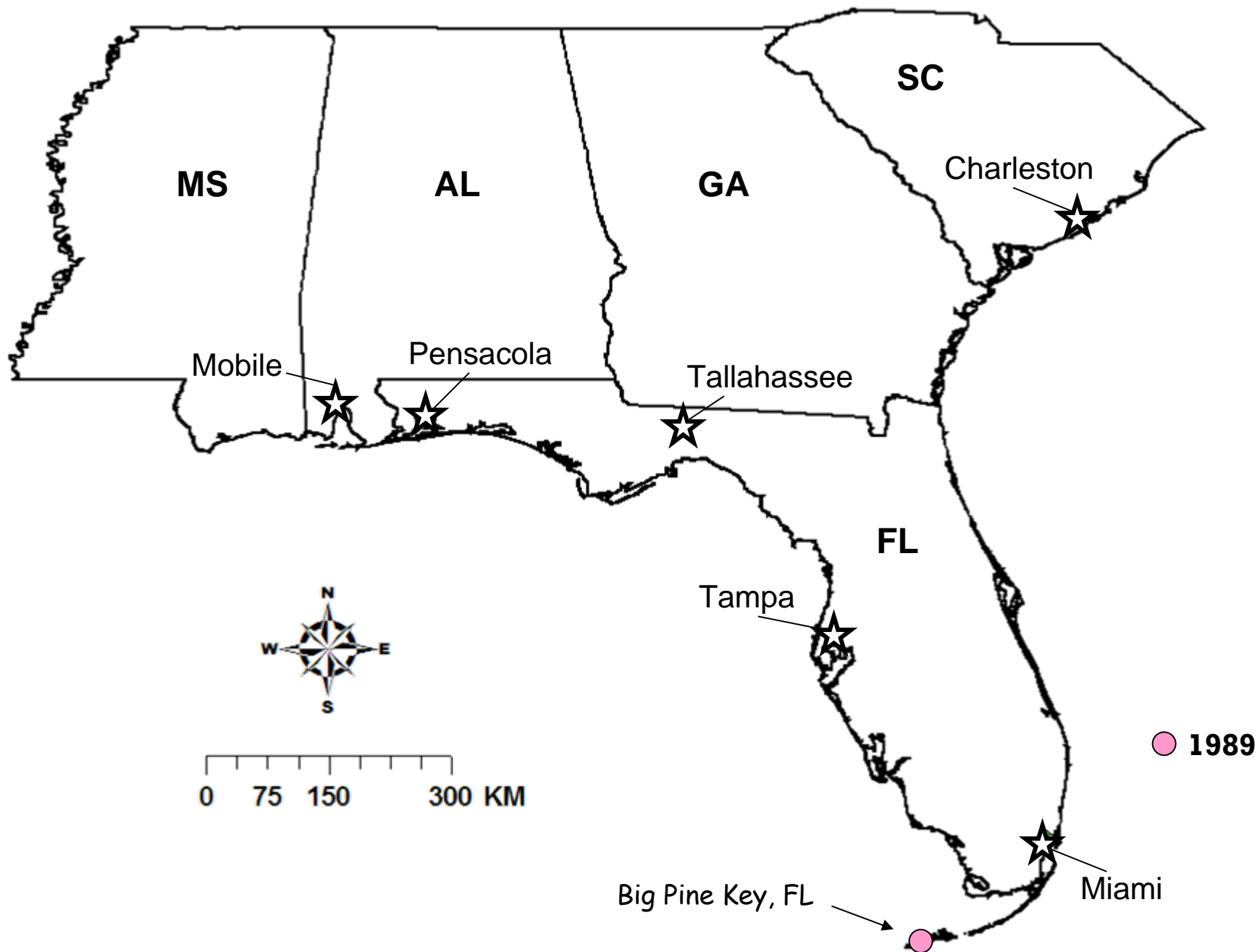


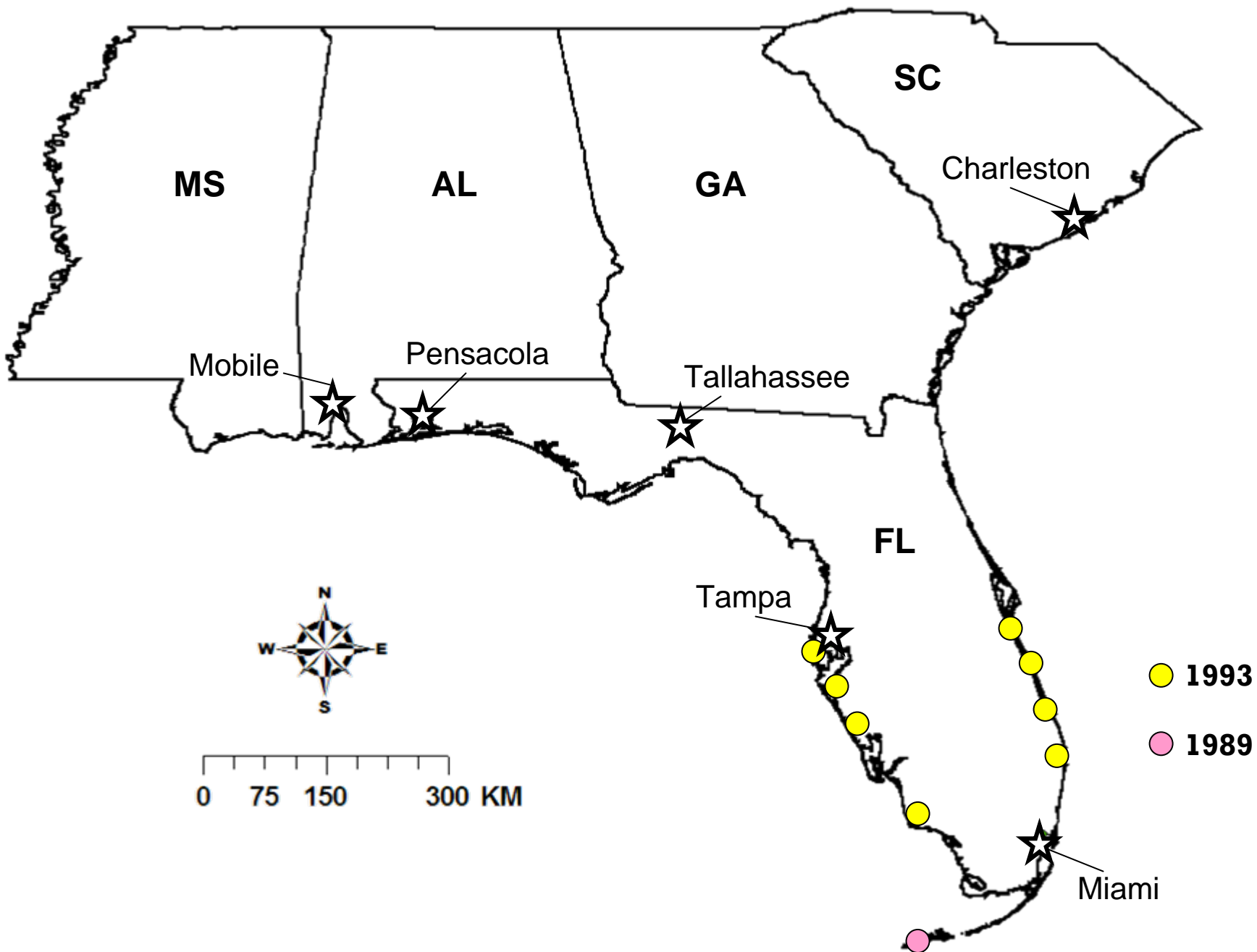




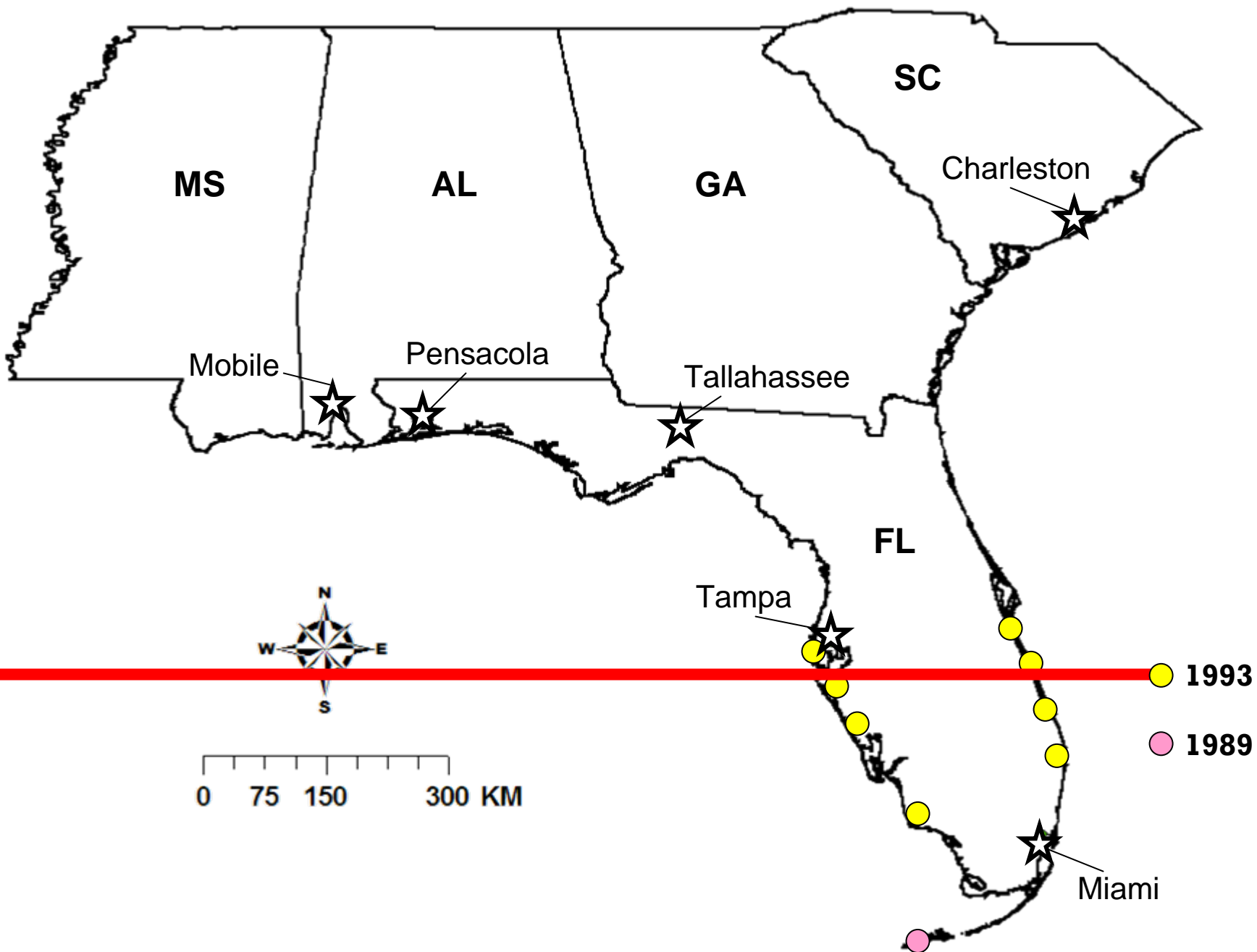
## 1989

- October – 1st detection on *O. stricta* at Big Pine Key by C. Lippencott, Fairchild Tropical Garden, Miami, FL.
- Recorded from *O. stricta* at Guantanamo Bay, Cuba, by Heed & Starmer, Syracuse University, 1988.
- Prior to 1989, larvae intercepted at the Miami Plant Inspection Station on 13 separate occasions in commercial *Opuntia* cuttings shipped from the DR.
- FL Dept. of Agriculture begins recording interception data throughout the State.



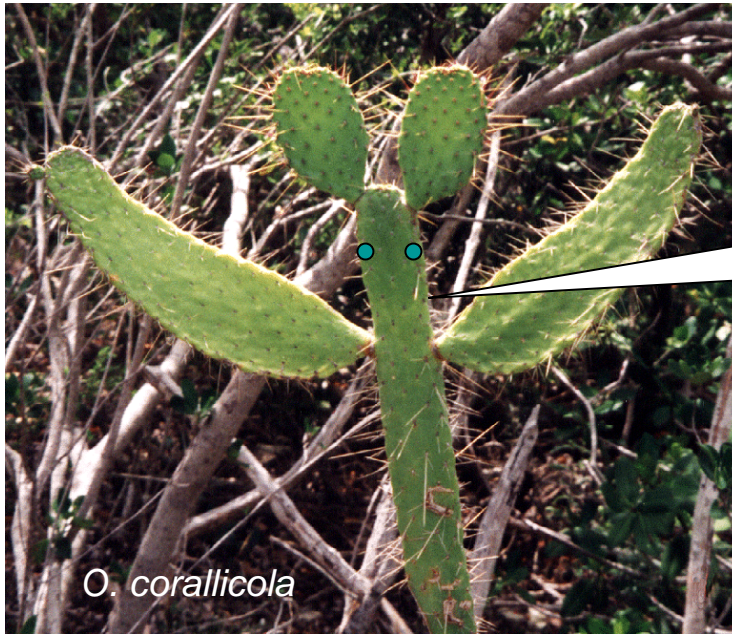




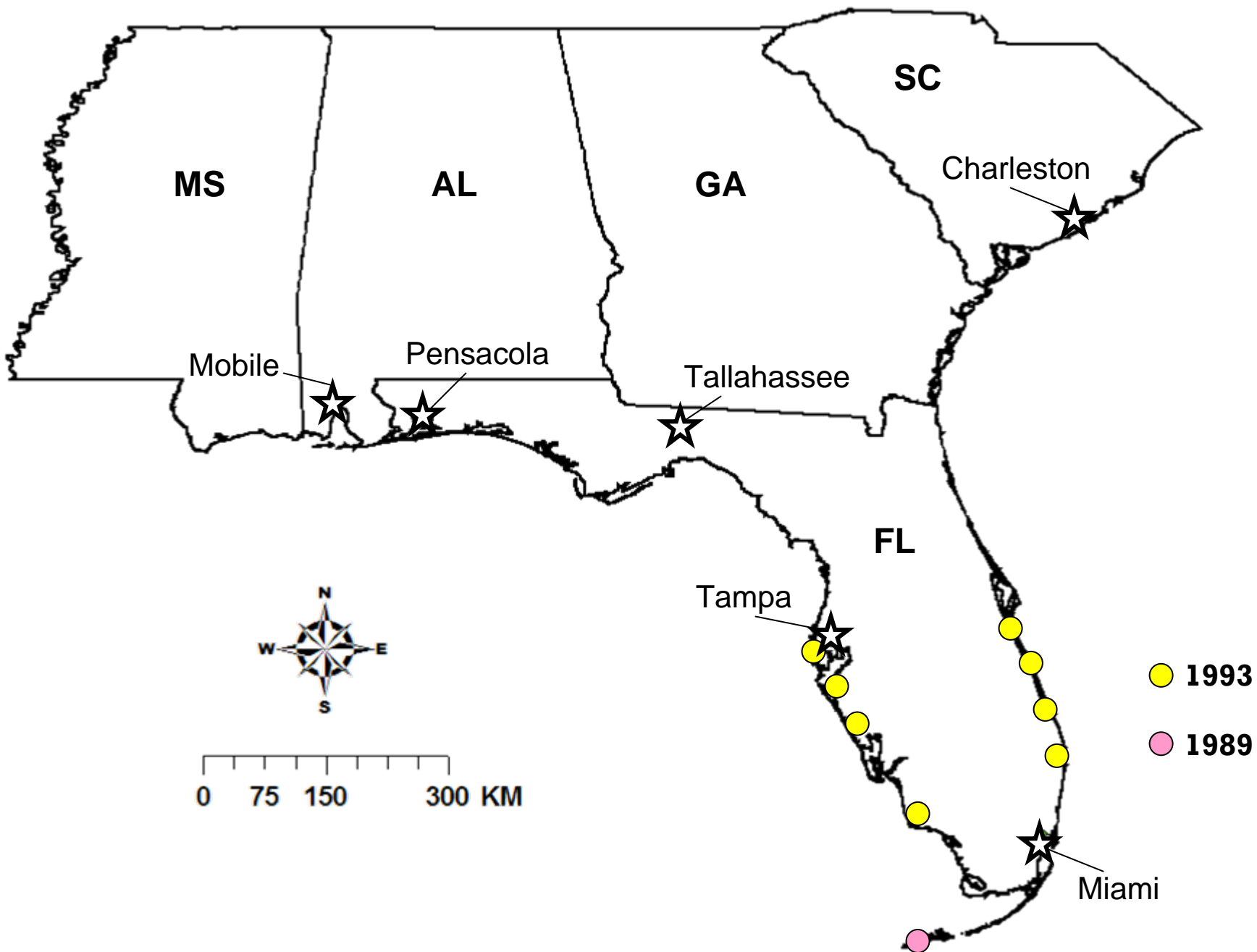


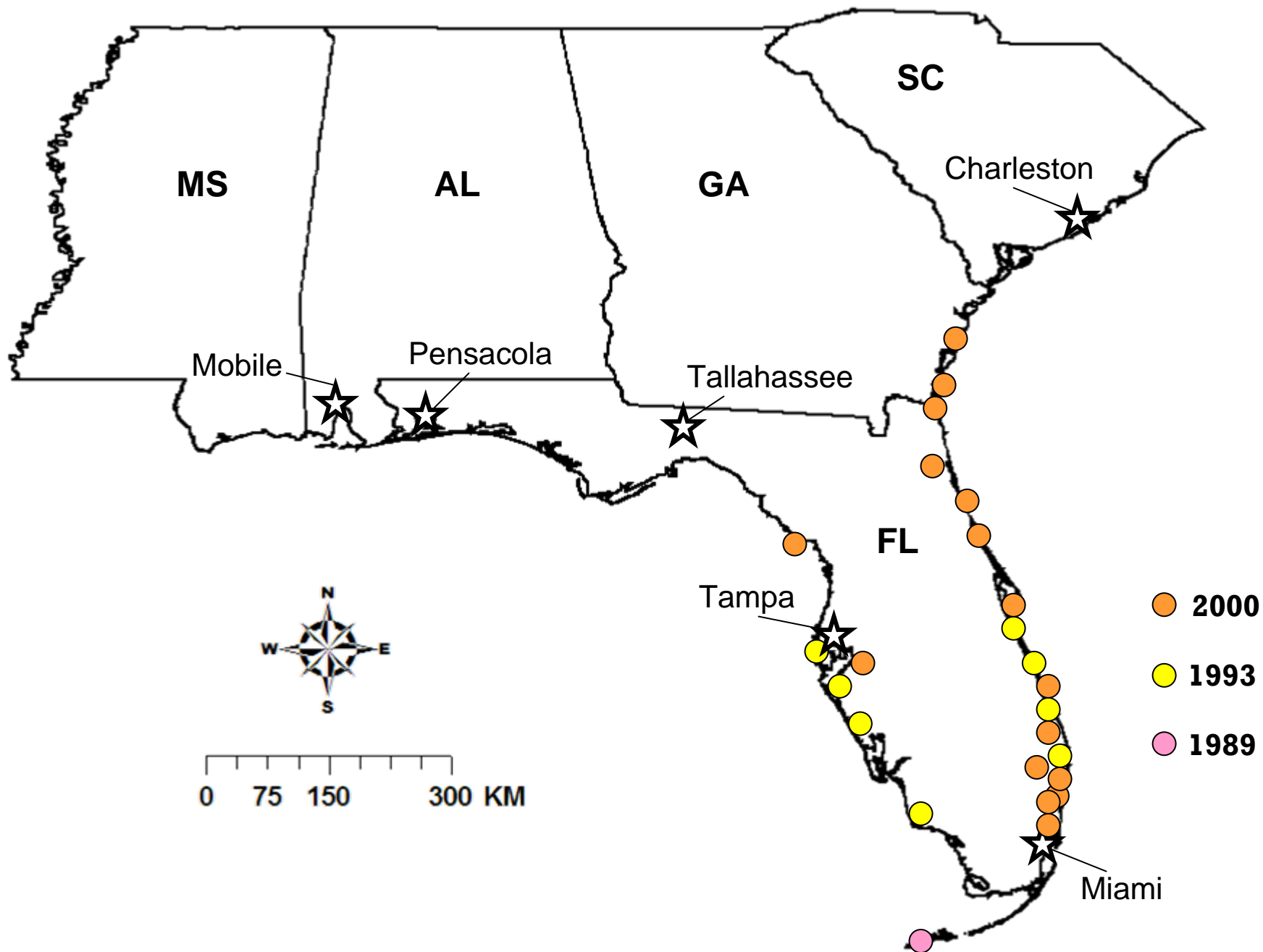
## 1993

- Nature Conservancy concerned about cactus moth attacks on rare prickly pear species - *O. triacantha* and *O. corallicola*.
- Peter Stiling & colleagues (University of South Florida) begin research on impact & spread of cactus moth in Florida.

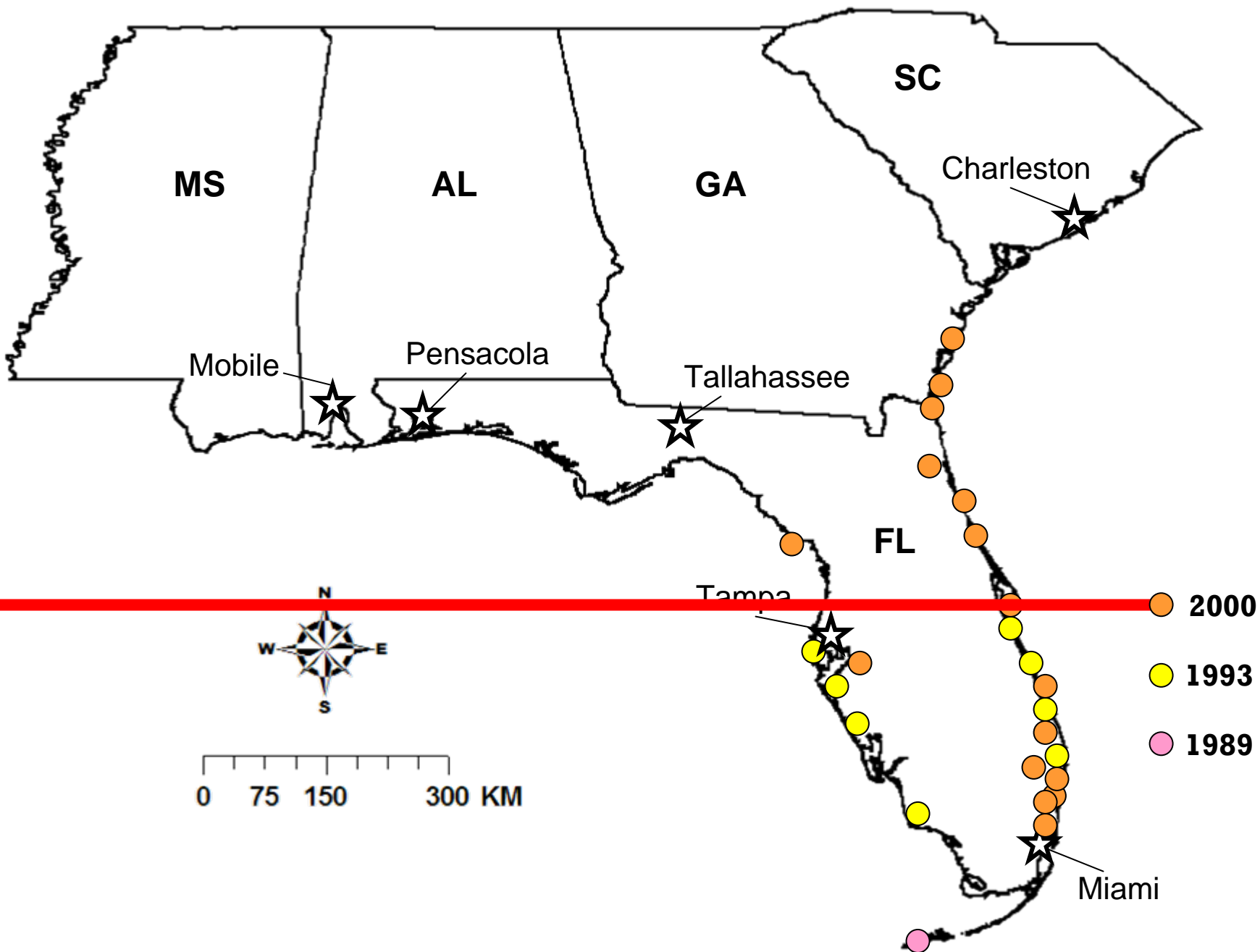


Heeelp !!



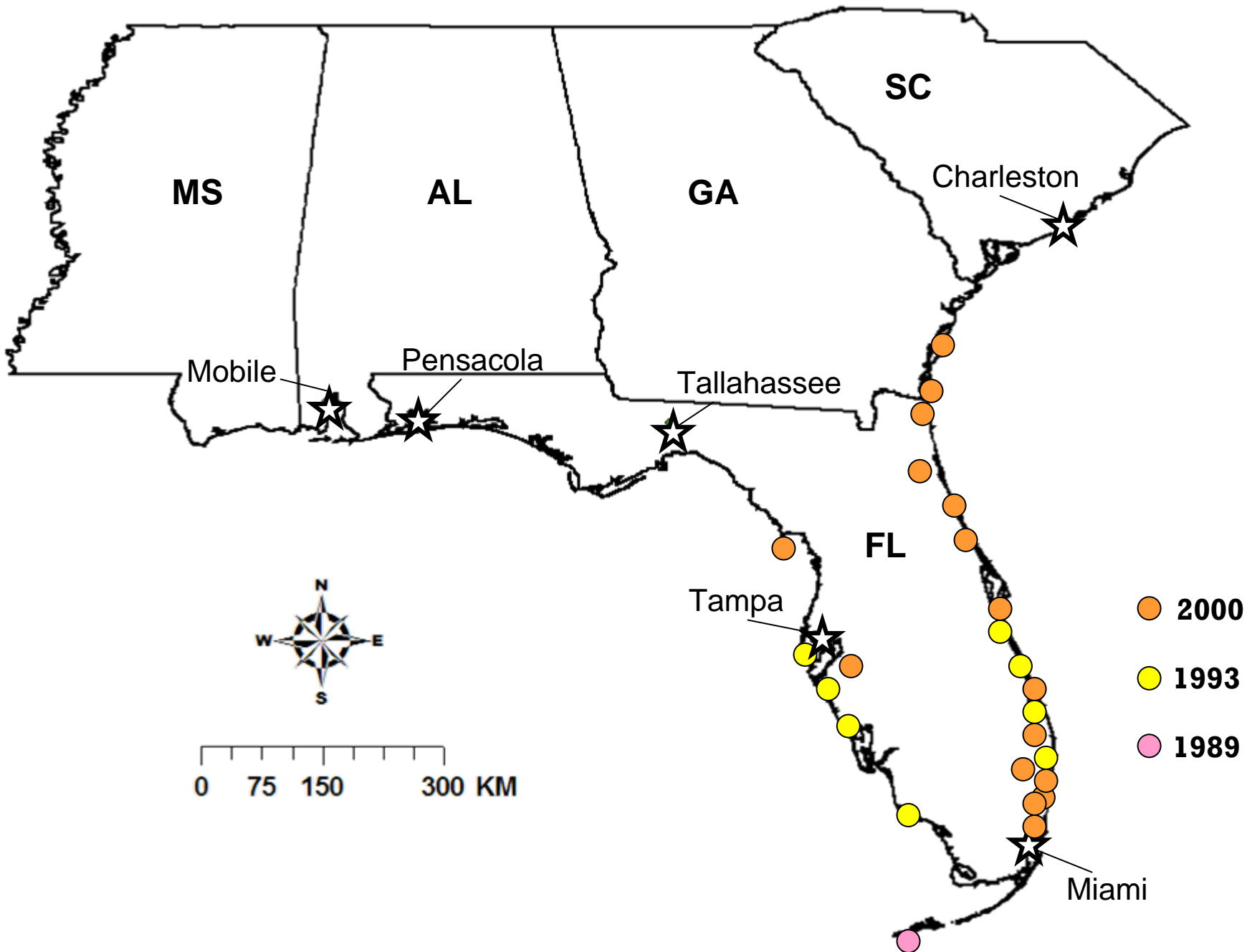


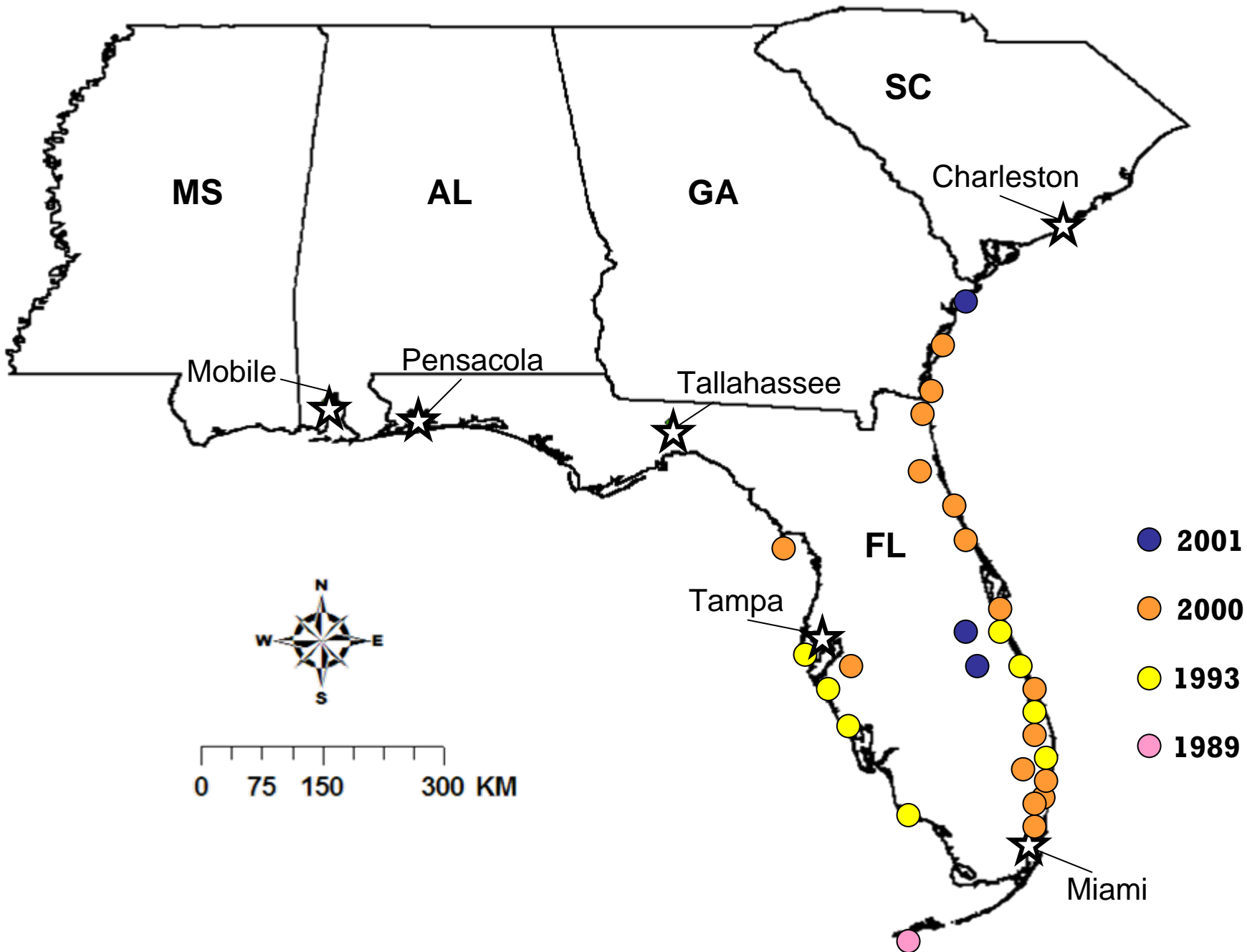




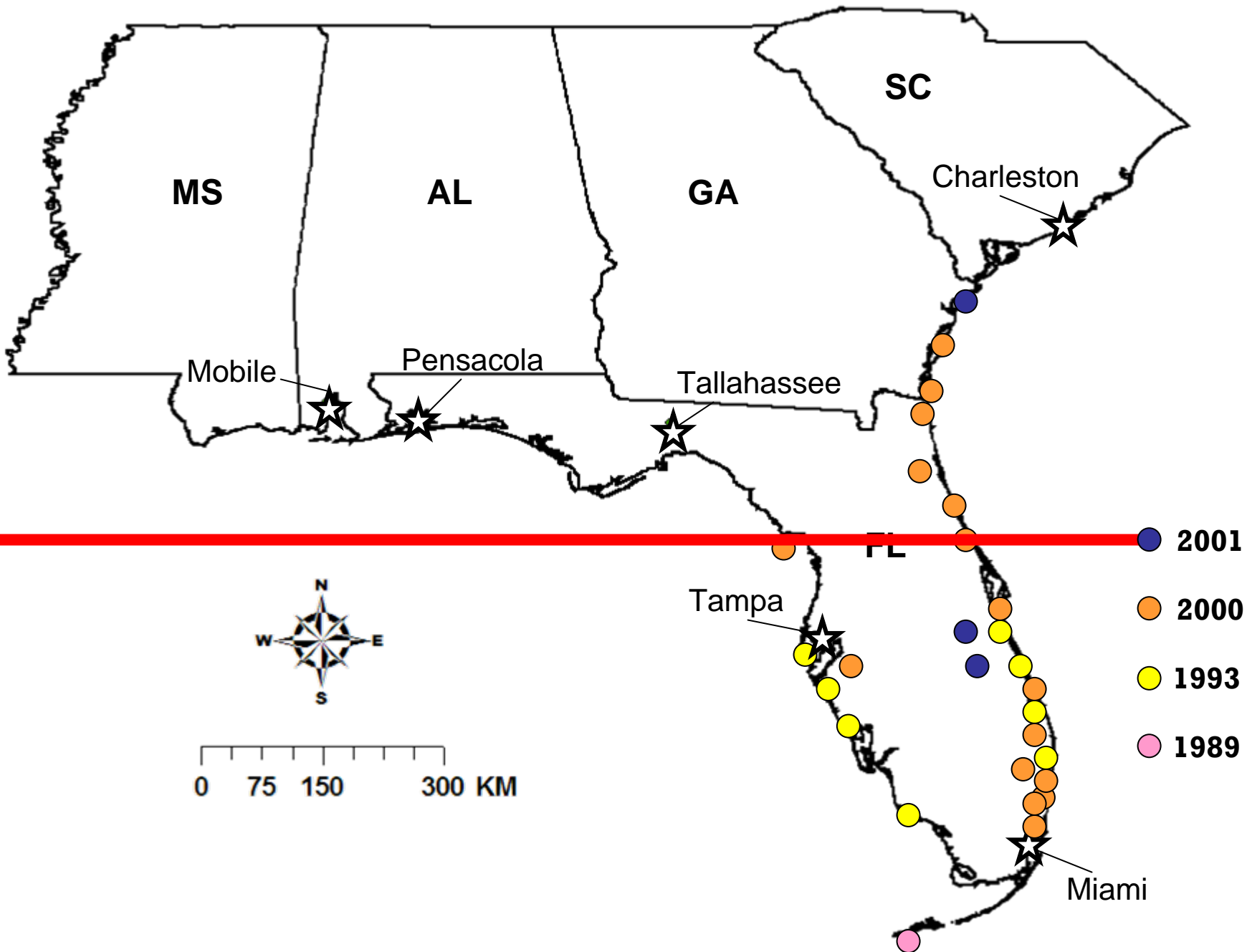
## 2000

- Dan Mahr (University of Wisconsin and Cactus & Succulent Society of America) raises concern of cactus moth in NA to USDA-APHIS National Biological Control Institute.
  - ... leads to 1st workshop for Assessment & Planning, Miami, FL, Sept. 2000.
  - ... Proceedings published in 2001 Florida Entomologist 84: 465-551.
- USDA-ARS & USDA-APHIS scientists initiate studies to develop management strategies based on the Sterile Insect Technique (SIT). Team includes K. Bloem, S. Bloem, J. Carpenter & S. Hight.



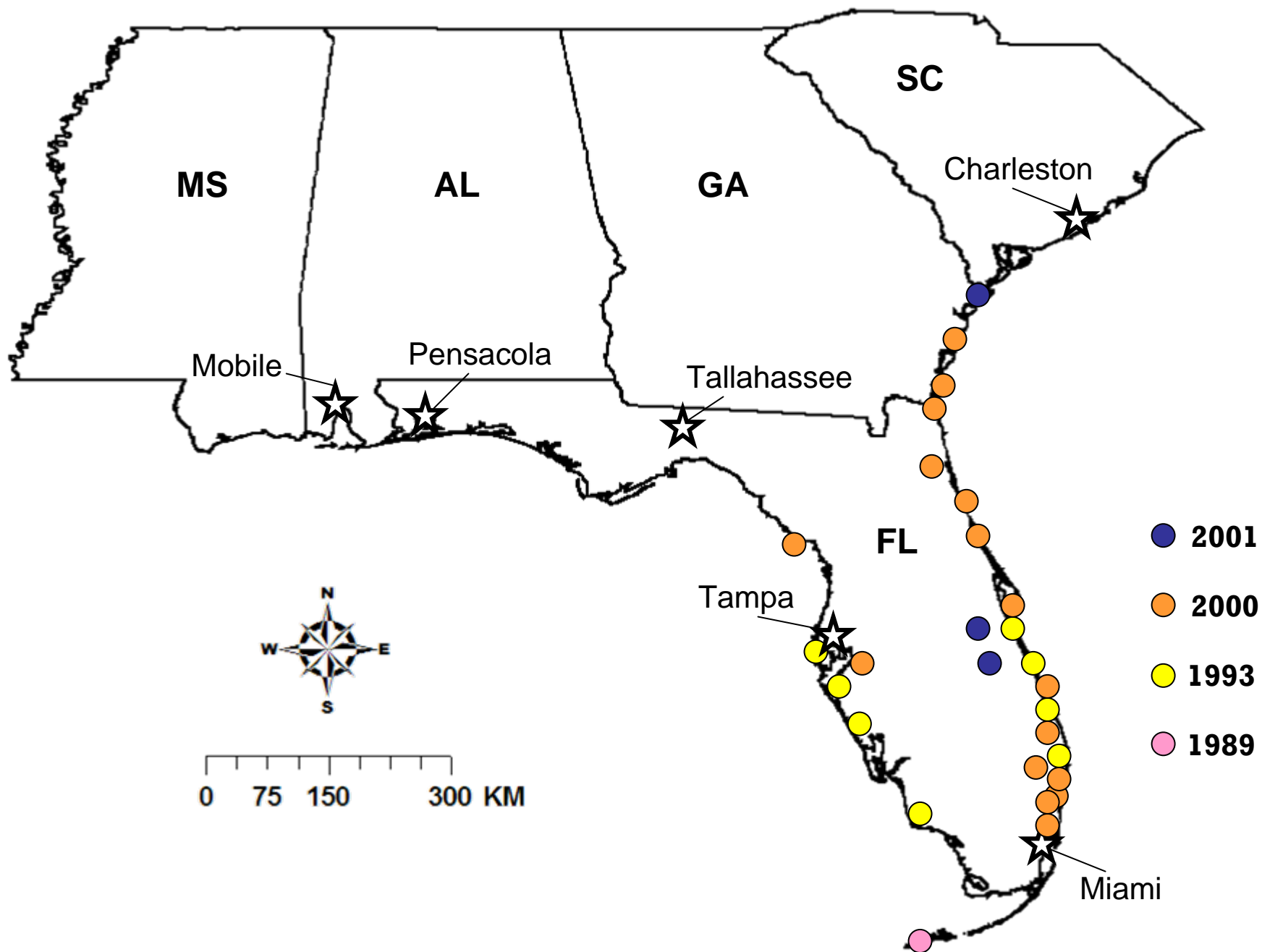


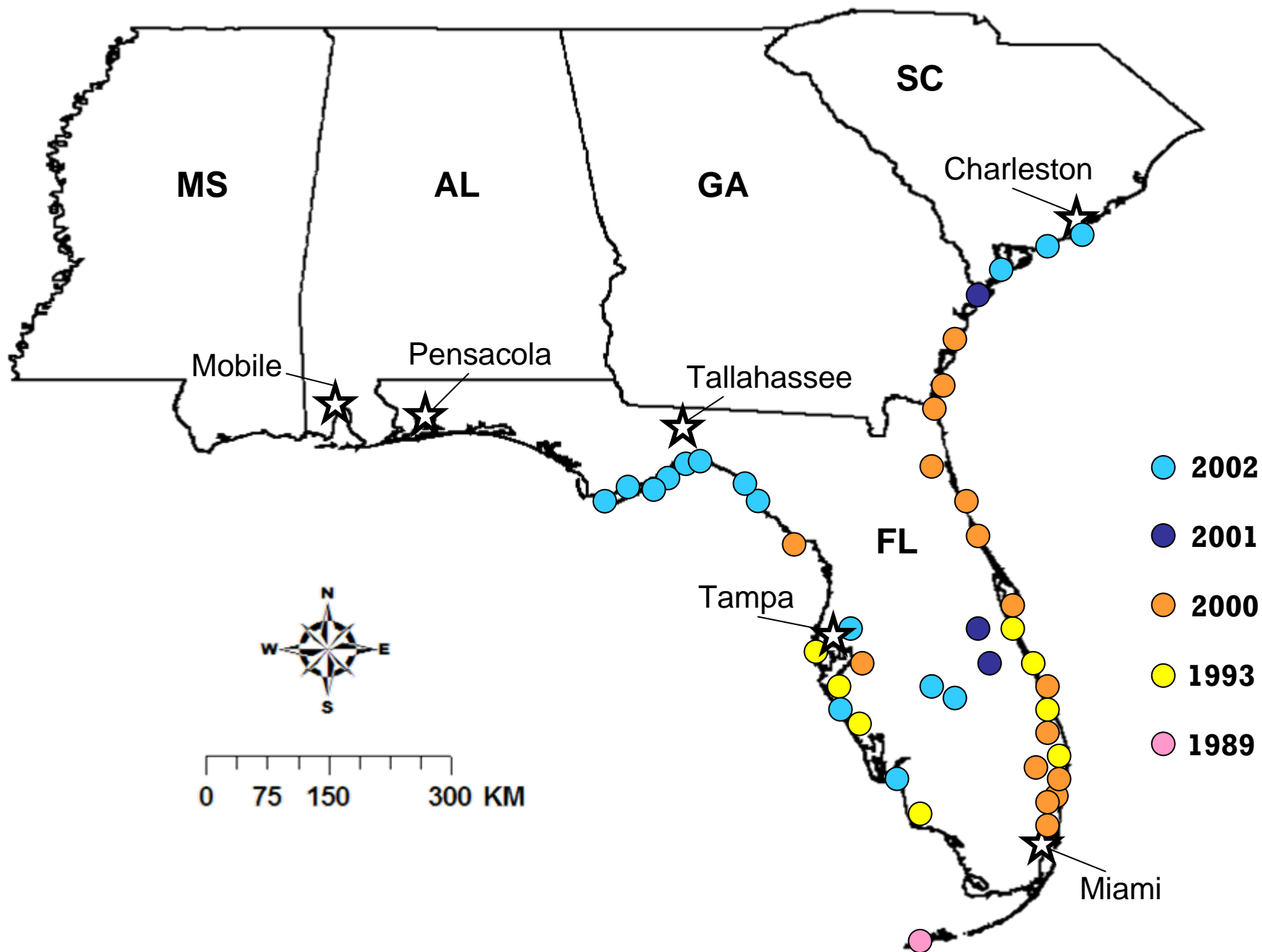




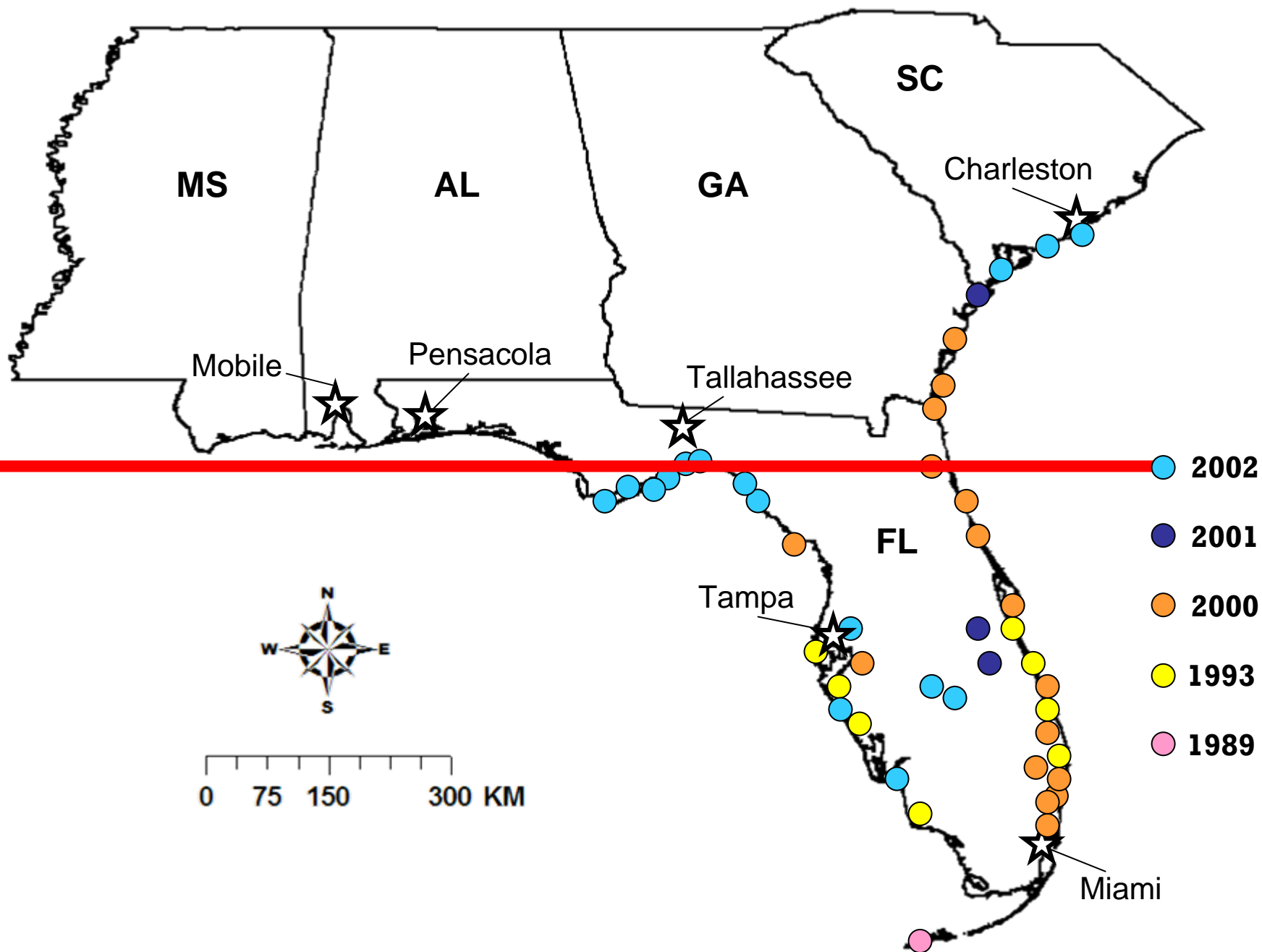
## 2001

- Irradiation protocols developed for sterilizing male and female cactus moths.
- Bob Heath & colleagues (USDA-ARS, Miami, FL) begin work on identification of sex pheromone.



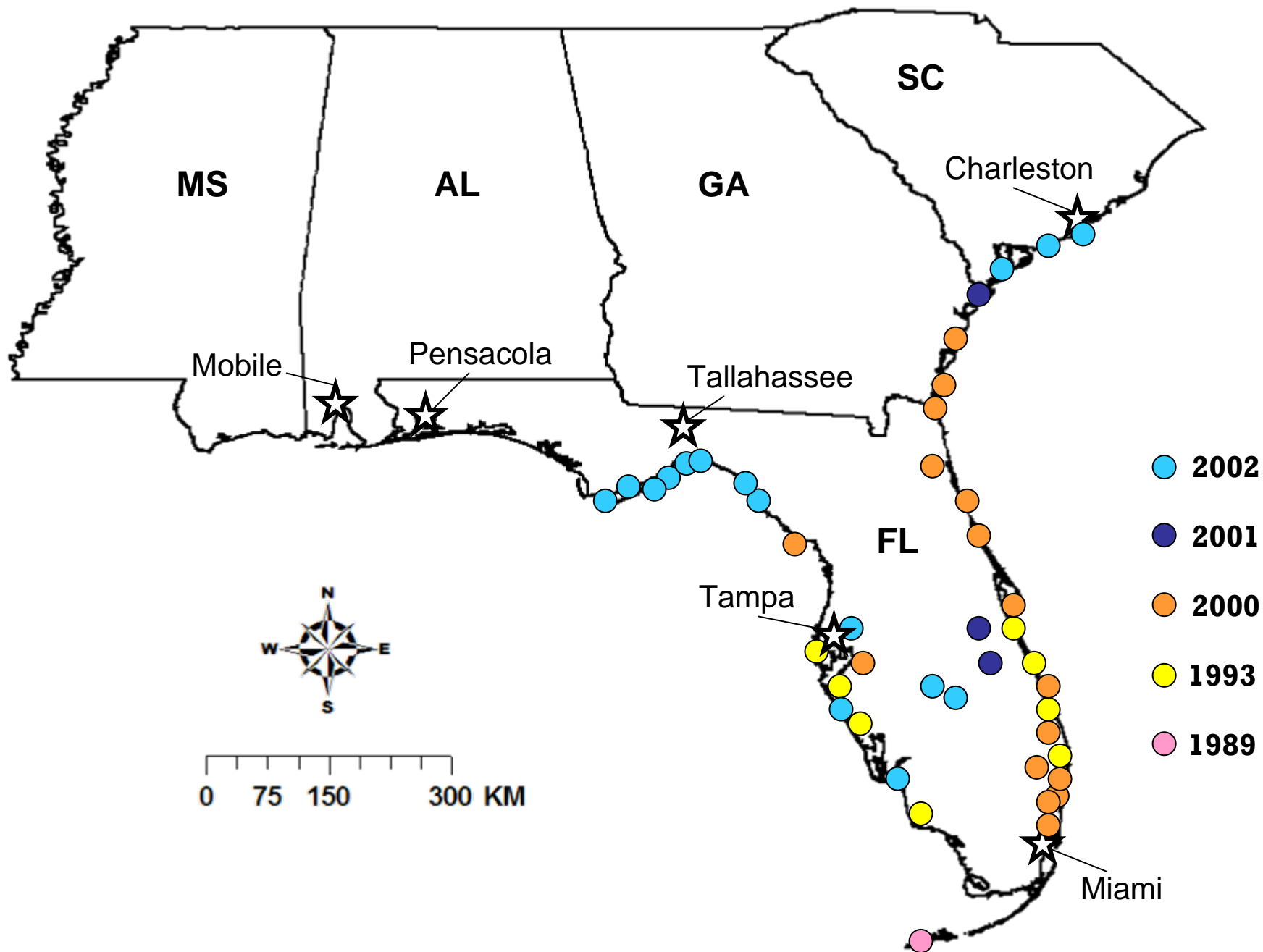


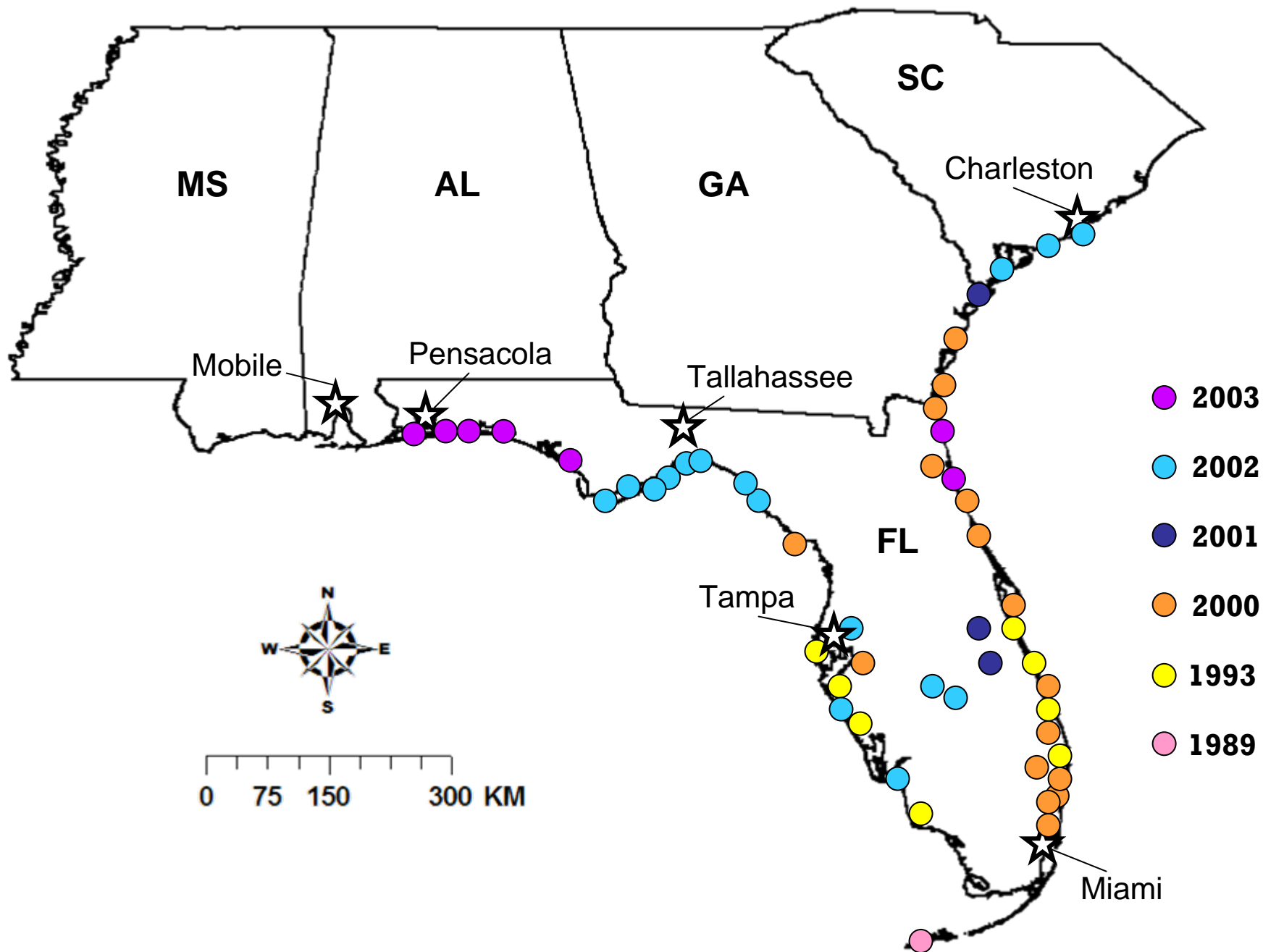


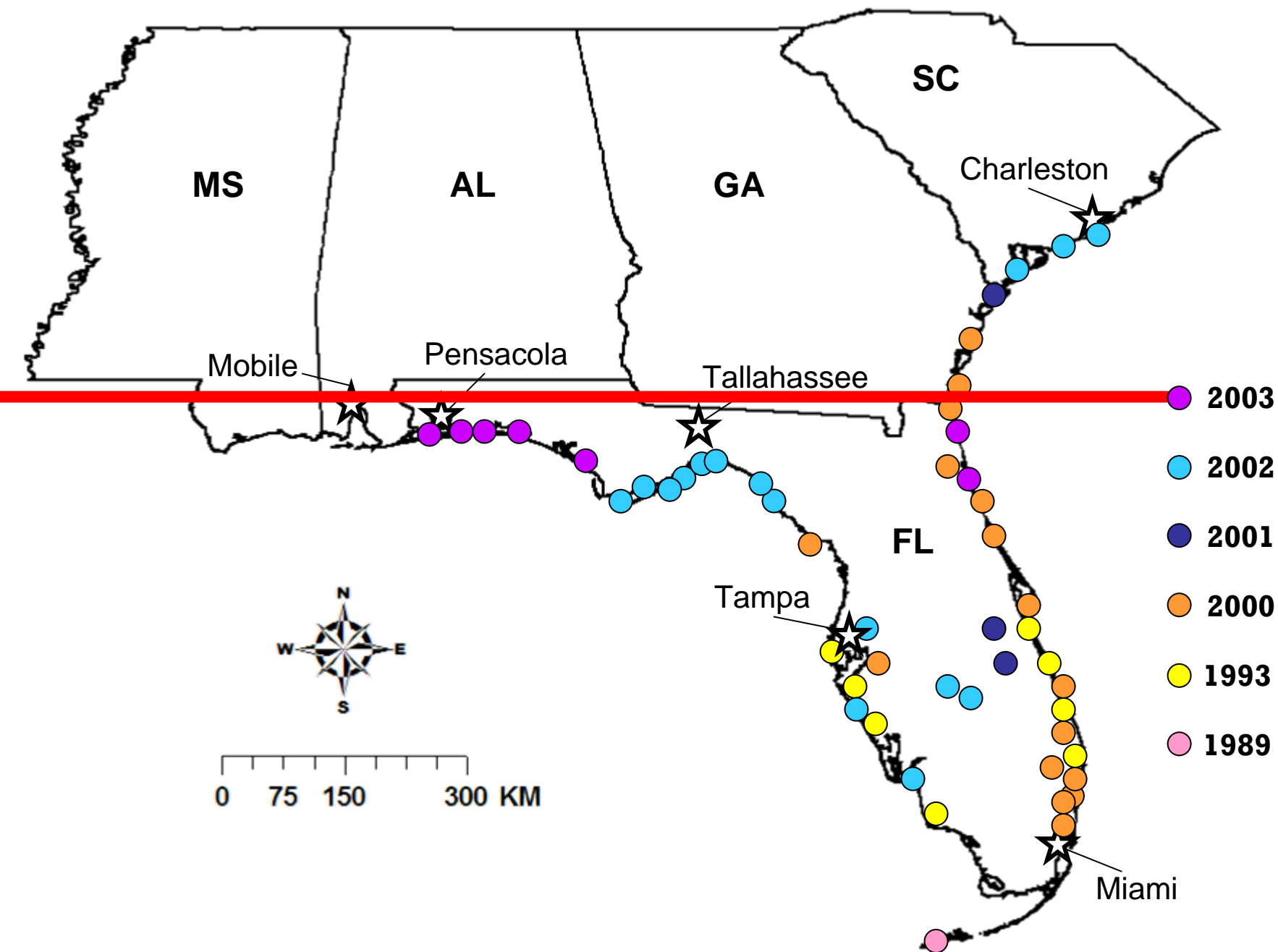


## 2002

- July – Consultant's Meeting organized by Department of Technical Co-operation of the International Atomic Energy Agency & the Joint FAO-IAEA Division of Nuclear Applications in Food & Agriculture, Vienna, Austria.
- November – Entomological Society of America Symposium: "Emerging ecological concerns for *C. cactorum* in NA".
- December – APHIS-PPQ recommends that Emergency and Domestic Programs (EDP) develop a strategic plan to manage the cactus moth, which is taken-up by Joel Floyd (Riverdale, MD).



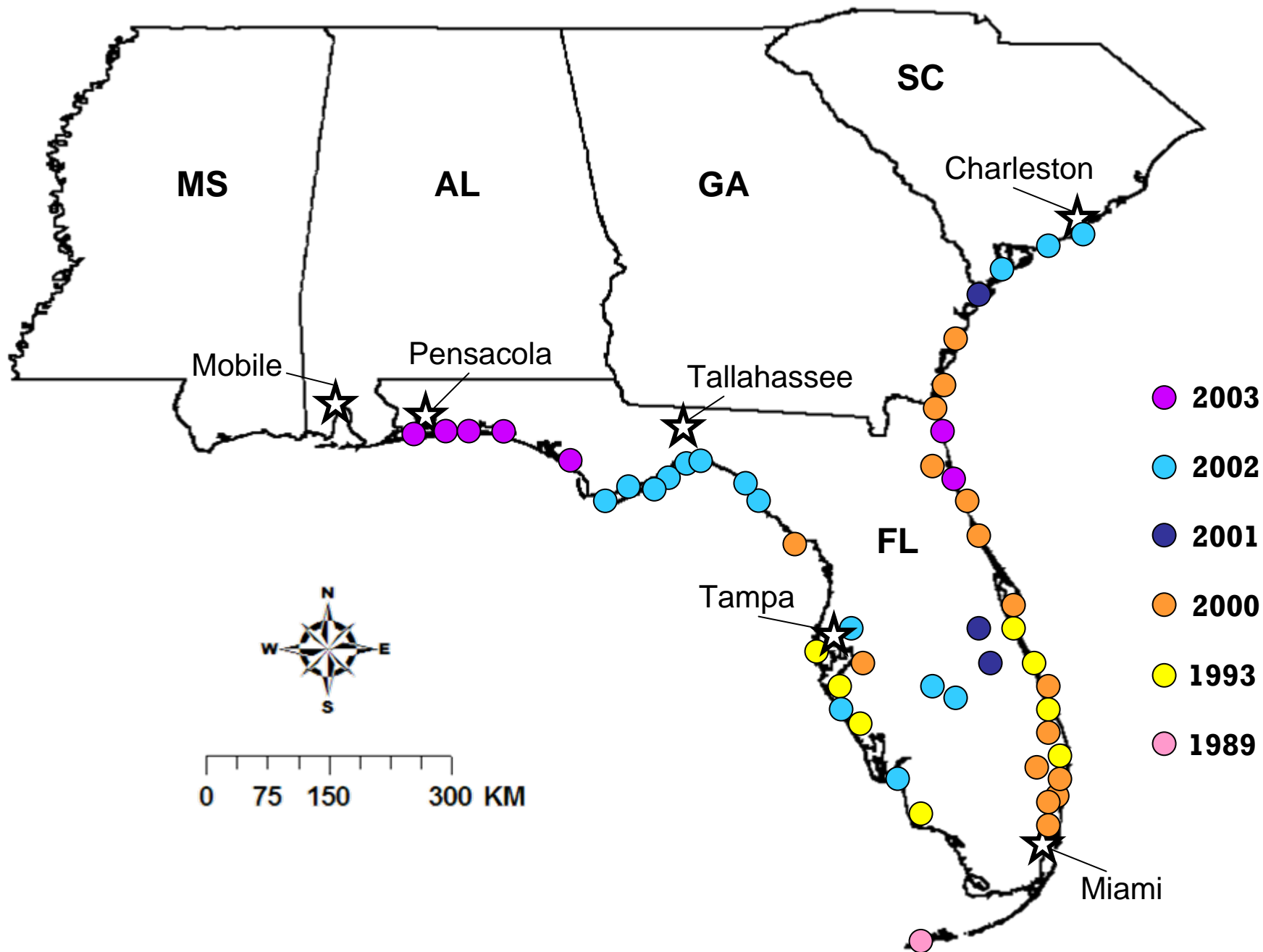


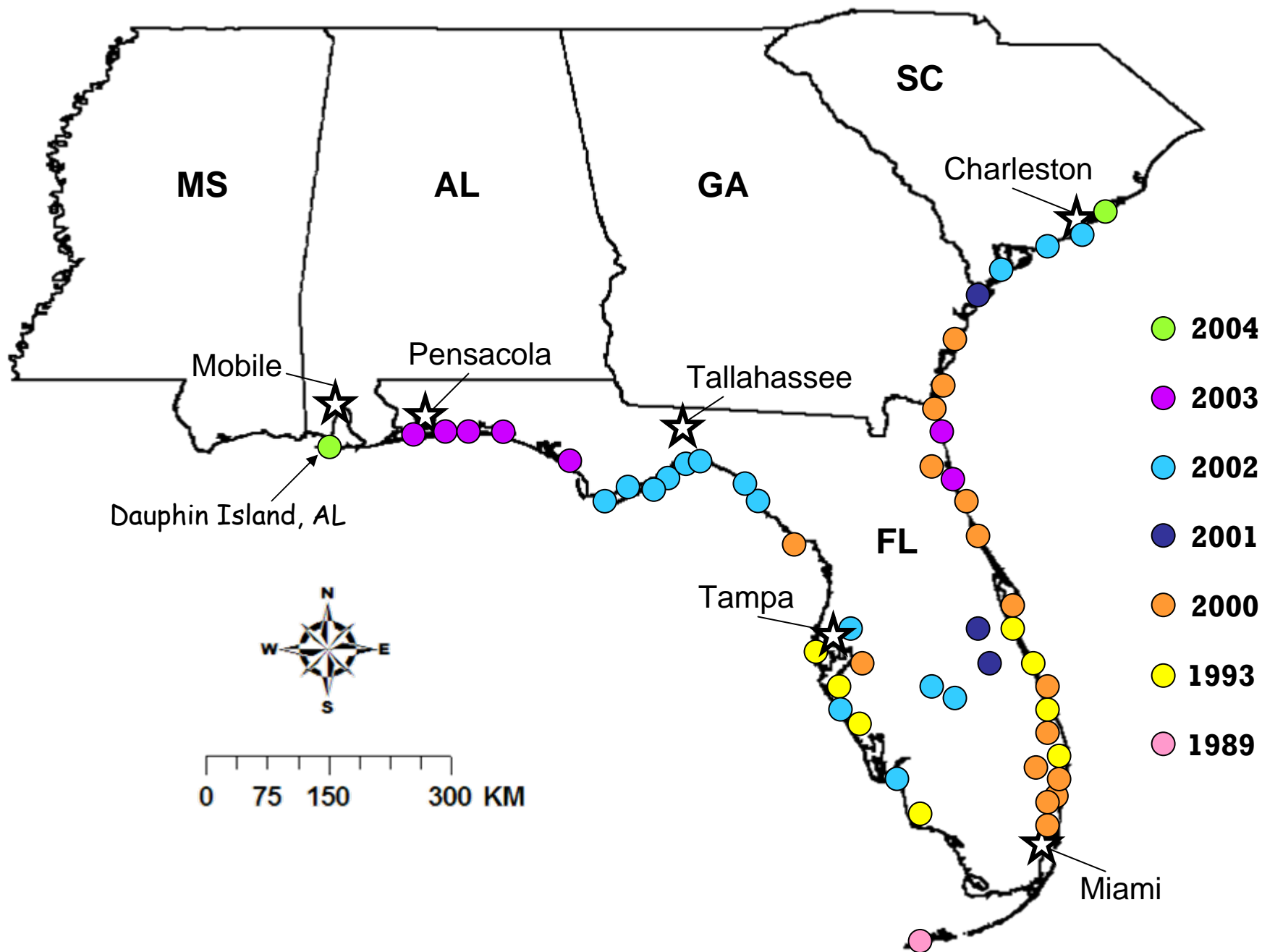


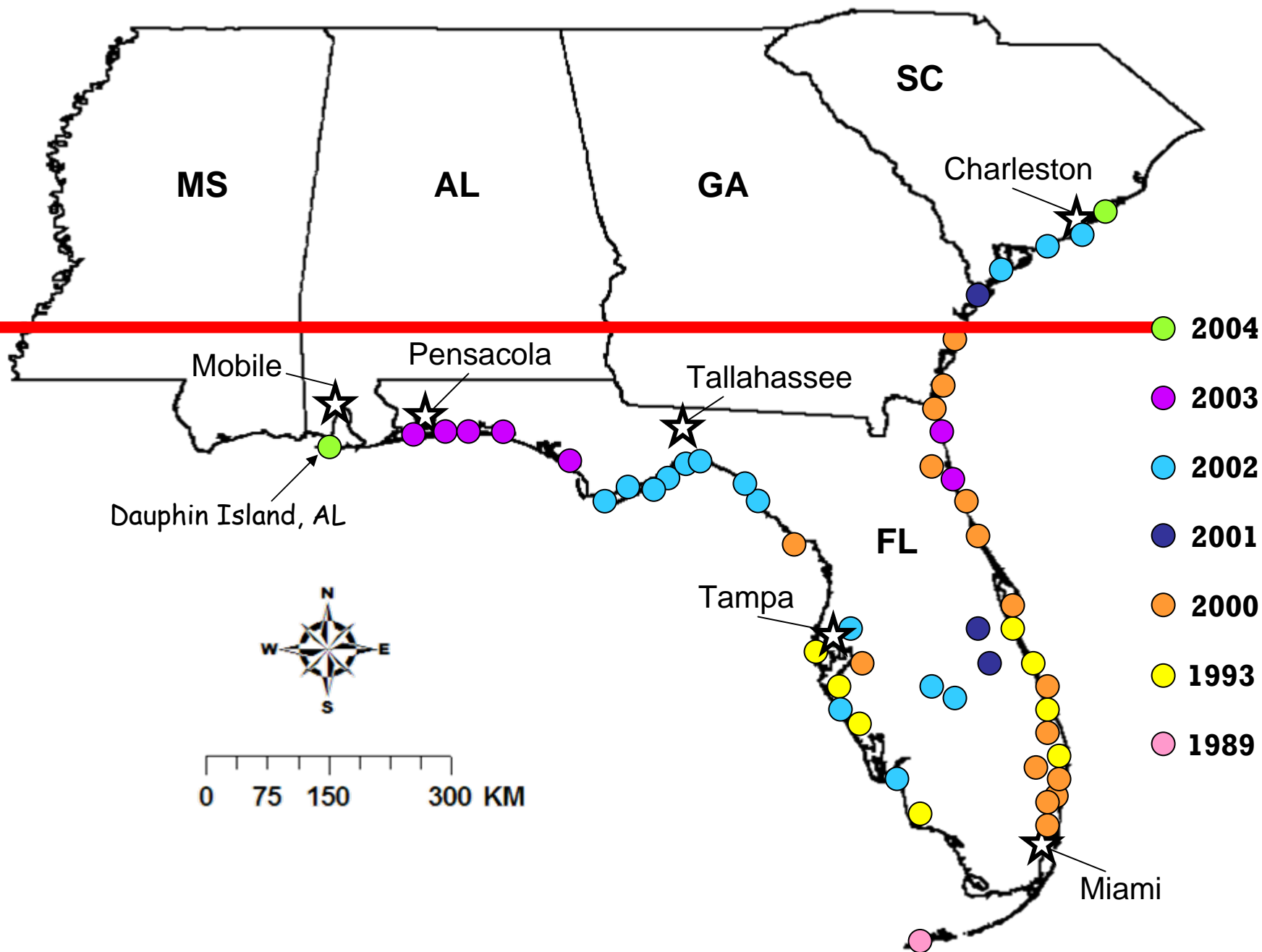


## **2003**

- April – Begin using sterile females in traps to monitor and survey for new infestation sites - evaluate trap type and trap height.
- July – Determine courtship and mating behaviors of cactus moth.
- September – Conduct field cage evaluation of the SIT - determine overflooding ratios.
- November – 1<sup>st</sup> putative pheromone lures field tested in South Africa.
- December – Planning meeting sponsored by APHIS-PPQ in Miami, FL, to discuss current pest status, research needs & drafting of strategic plan. Co-sponsors are USDA-ARS, US Geological Survey (USGS) and Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP).



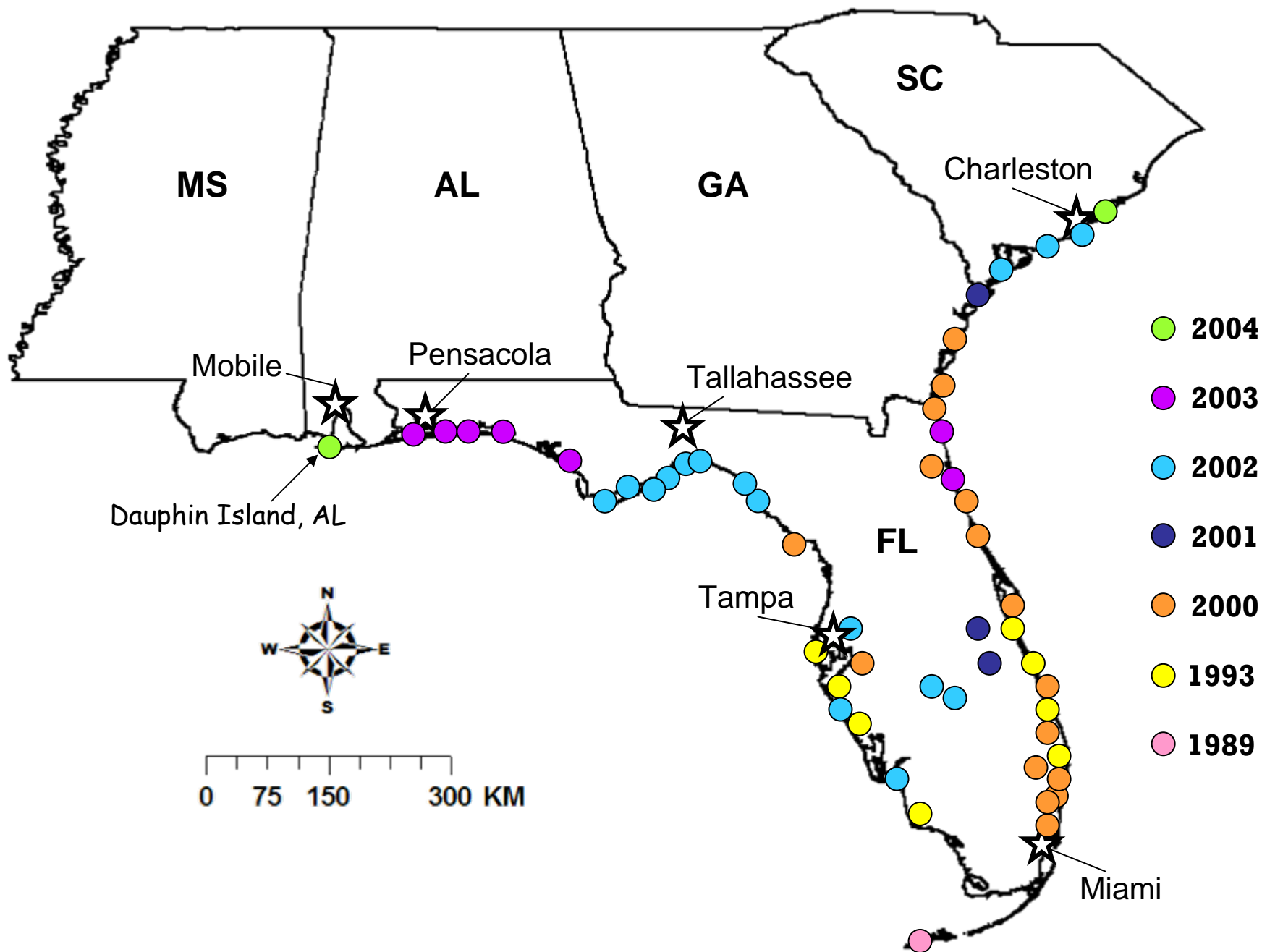


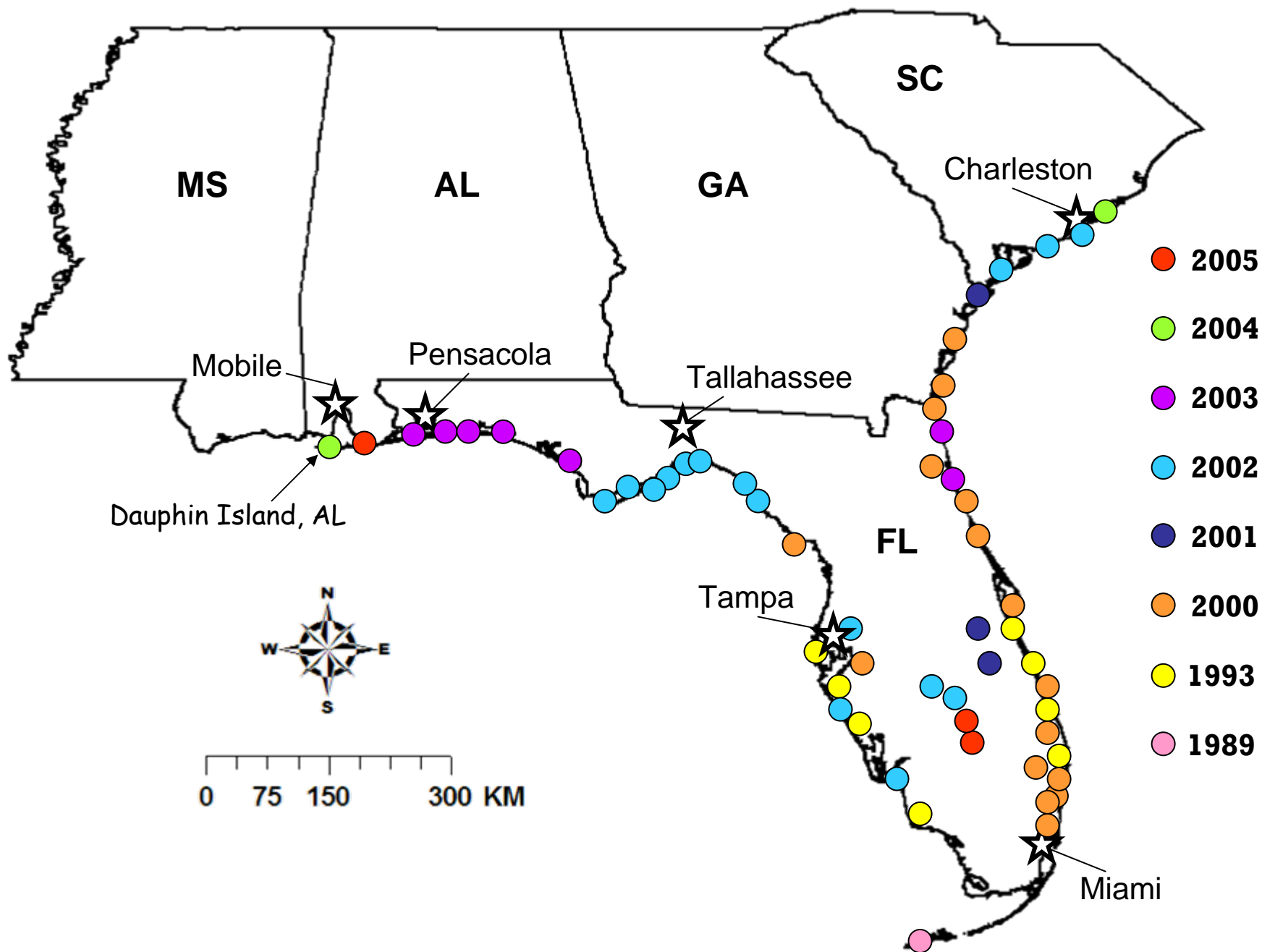


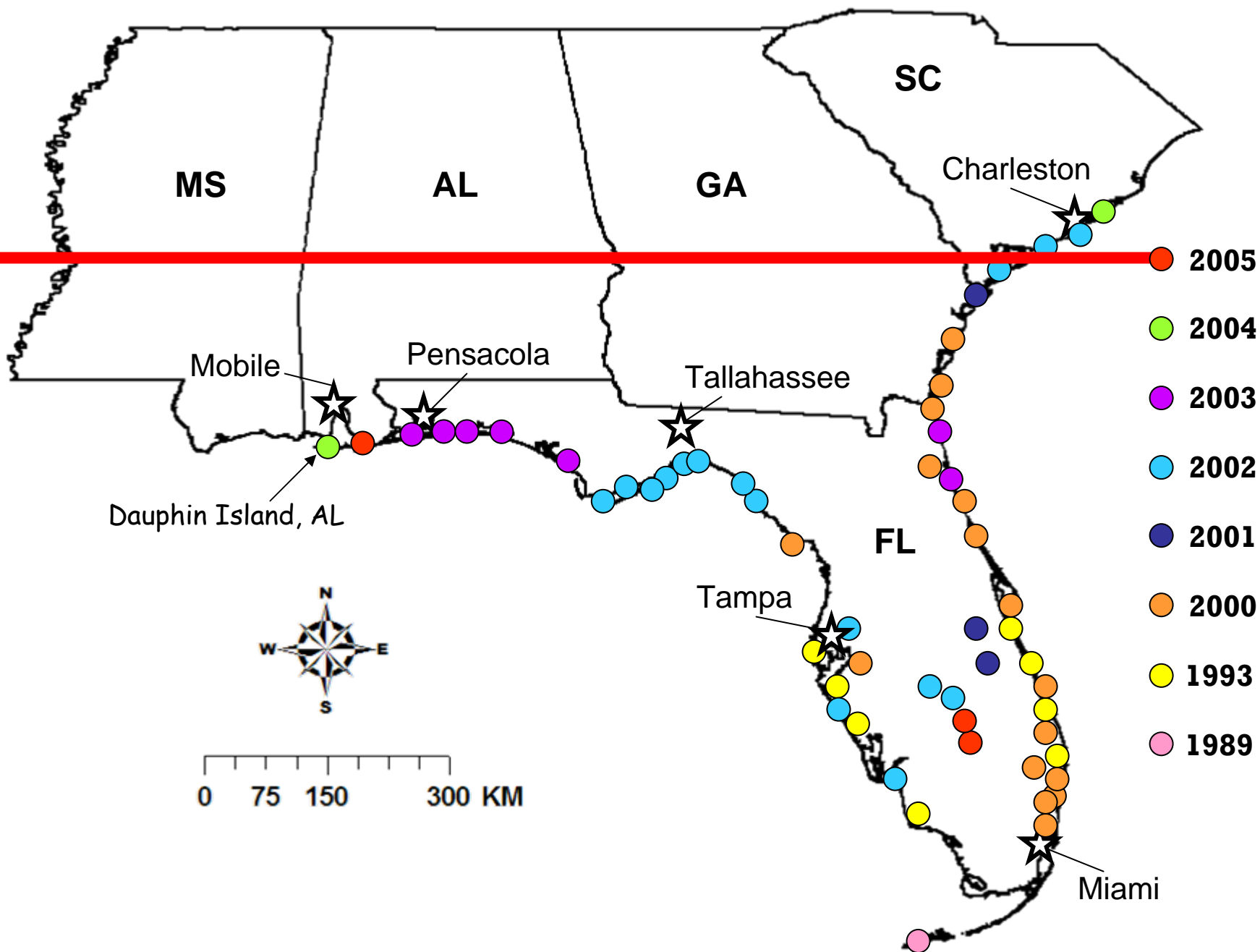
## 2004

- June – Meeting in Pensacola, FL, to develop survey plans for tracking infested/non-infested cactus on US public & private lands. Stakeholders included APHIS-PPQ, ARS, USGS, MSU's GeoResources Institute at MSU, PPQ & State pest survey specialists, Nature Conservancy. Follow-up meetings in Riverdale, MD, and Starkville, MS.
  - International Regional Forum on Cactus Moth, Mexico City, MX.
- July – 1<sup>st</sup> detection in AL at Dauphin Island - initiate clean-up activities.
  - Expanded field tests of reformulated experimental lures; evaluate trap color & effectiveness of insecticides for ovicidal and larvalcidal activity
- White paper by L. Garrett (APHIS, Raleigh, NC) - Economic impact of *C. cactorum* in the US.
- APHIS-PPQ and ARS approve funding (\$65,000 each) to initiate SIT field studies; study sites chosen & monitoring of populations started.
- November – PPQ strategic plan is completed.









## 2005

- March – Initiate SIT validation study, including host removal & release of sterile moths.
  - USGS National Institute of Invasive Species Science at Ft. Collins, CO, completes “Preliminary assessment of potential impacts & risks of *C. cactorum* in US & Mexico” - funded by IAEA.
- Summer – John Madsen & Victor Maddox (MSU-GRI) develop a website and on-line system for public/volunteers to enter monitoring observations. [http://gri.msstate.edu/cactus\\_moth](http://gri.msstate.edu/cactus_moth)
  - Survey efforts beyond the leading edge supported by PPQ and State pest survey specialists (CAPS Program).
- November – APHIS-PPQ and SAGARPA each approve approximately \$500,000 for FY06 to cooperate in developing management tools & strategies to slow the spread of the cactus moth.
- December – ESA Symposium: “International response & update to the cactus moth problem in NA”.

## 2006

- March-June – SIT validation study completed.
- June – SIT verification activities initiated: sterile moth releases at Dauphin & Little Dauphin Islands; host plant removal at Little Dauphin Island & Ft. Morgan.
  - collaboration with Silvia Dorn (ETH, Zurich) to investigate cactus moth flight ability.
- August – SAGARPA reports detection of *C. cactorum* at Isla Mujeres, Quintana Roo, near Cancun and begins eradication efforts.
- October – APHIS-PPQ supervisor for cactus moth field operations is hired and office is opened at Pensacola, FL.
  - Update on Mexico-USA Cooperative Program on cactus moth is presented at NAPPO annual meeting.
- November – APHIS-PPQ and SAGARPA renew funding for FY07.
- December – Cactus moth appears eradicated from Dauphin Island.



## 2007

- February – Regulatory Technical Panel meets in Miami, FL, to develop certification program to minimize the risk of spreading *C. cactorum* from infested states through commercial cactus sales.
- Host plant removal & irradiated moth releases continue to focus on Little Dauphin Island & Ft. Morgan.

# Cactus Moth Leading Edge Infestations



Dauphin Island, AL



but... not THE END of the cactus moth